REPORT OF THE TRANSPORT SAFETY STANDARDS COMMITTEE (TRANSSC) – TWENTY SECOND MEETING

IAEA Meeting Room (Board Room A)

14-17th June 2011

1.0 OPENING SESSION
1.1 Opening Remarks IAEA

Mr Al Khatibeh, Section Head of Regulatory Infrastructure and Transport on behalf of the Deputy Director General, Head of the Department of Nuclear Safety and Security, Mr D Flory, and Mr. P-S Hahn, Director, Division of Radiation, Transport and Waste Safety, welcomed all participants, in particular the new members to the committee, and formally opened the twenty second meeting of the Transport Safety Standards Committee (TRANSSC). He mentioned that this was the first meeting of the 2011-2013 term of the committee and thanked all for their support. He was pleased to inform the meeting that currently projects are being developed by Technical Cooperation in the transport area. He also mentioned the important agenda item for the week, being the review and resolution of 120 day Member State and TRANSSC member comments for TS-R-1 and approving the final draft for endorsement by the Commission for Safety Standards (CSS). He outlined that this process is the result of completing multiple steps as outlined in the Strategy and Process for the Establishing of Safety Standards (SPCSS), as will be explained further during the first day of the meeting. He introduced Mr William Brach of the United States of America, the returning chair of TRANSSC, and thanked him for accepting the invitation to continue as chair for another three years.

A full copy of his comments is attached as Annex 1

1.2 Remarks from Chair of TRANSSC

Mr Brach also welcomed all participants in particular those who were new to this committee. He noted that for the new TRANSSC term, 44 Member States have nominated members to TRANSSC, and approximately one third of the TRANSSC members for this new term are new to TRANSSC. To help new TRANSSC members, and serve as a refresher for others, Mr. Brach identified a new item on TRANSSC orientation and induction on the meeting agenda along with training on the UN Orange Book. Mr Brach thanked Mr. Kirchnawy, Austria, who graciously volunteered to provide the UN Orange Book training. Mr Brach stated that the first and foremost item for TRANSSC 22 is the need to review and agree on the disposition and closure of all Member State comments, TRANSSC member comments and others’ comments on the proposed revisions to TS-R-1, 20XX Edition. The goal is to develop a clear and documented record of the TRANSSC accepted disposition of all comments. TRANSSC will address and resolve all comments in plenary, but breakout/working group rooms will be available if needed. Mr Brach identified an additional new meeting agenda topic to develop a three year work plan for TRANSSC for the new term, 2011-2013.

A full copy of his comments is attached as Annex 2

2.0 ADMINISTRATIVE ITEMS
2.1 Conduct of the meeting

2.1.1 The provisional TRANSSC 22 agenda, Rev 1, was reviewed and adopted. The final agreed meeting agenda, Rev 1 is attached as Annex 3. Due to the heavy commitment of the task the meeting was closed at 15:30 hours and not as originally envisaged at noon.

**TRANSSC DECISION: TRANSSC 22 MEETING AGENDA APPROVED**

2.1.2 Terms of Reference

The chair highlighted changes in the TRANSSC Terms of Reference for the new term, 2011-2013. No comment was received and they were endorsed by the meeting.

A copy of the new Terms of Reference was posted on the TRANSSC 22 web page.

**TRANSSC DECISION: TERMS OF REFERENCE ACCEPTED**

2.1.3 Administrative Meeting arrangements

Mr Stewart provided administrative information.

2.1.4 Previous Meeting report

No comments were received on the TRANSSC 21 draft meeting report as posted. TRANSSC 22 accepted the draft meeting report as an accurate reflection of the 21st TRANSSC meeting

**TRANSSC DECISION: TRANSSC 21 MEETING REPORT APPROVED**

2.2 Topical Briefing

2.2.1 2008-2011 Overview

Mr Brach provided an overview of the TRANSSC Three Year Term Report for 2008 – 2010. He highlighted the significant accomplishments of TRANSSC during the past term, including a number of “firsts” for TRANSSC in completing and publishing the entire suite of transport safety standards and preparing revisions to the safety guide, TS-G-1.1, in parallel with revisions to the transport safety standard, TS-R-1. In addition TRANSSC is on schedule to complete the revision of TS-R-1 within two years of CSS approval of the DPP and three years of the start of the 2009 review cycle. Mr. Brach also identified a number of near term actions and additional challenges for TRANSSC for the new term, 2011-2013. Mr Brach noted that the planned actions and challenges listed in the Three Year Term Report will serve as a starting point for TRANSSC 22 development of a three year working plan for TRANSSC to be discussed under agenda item 3.

A copy of Mr Brach’s presentation and a copy of the TRANSSC Three Year Term Report were posted on the TRANSSC 22 web page.

2.2.2 Code of Conduct Import Export Guide

Mr Hilaire Mansoux, Head of Control of Radiation Sources provided a summary of the IAEA efforts to develop a guide to support the implementation of the Code of Conduct for
import/export considerations. In May 2010, the Secretariat convened an open-ended meeting of technical and legal experts for Sharing of Information on States’ Implementation of the Code of Conduct on the Safety and Security of Radioactive Sources and its supplementary Guidance on the Import and Export of Radioactive Sources. This meeting recommended that a process for the review and revision of the Guidance and including an initial consultants’ meeting, with the recommendations of that meeting to be put to an open-ended meeting in mid-2011 be put in place by the Secretariat.

In January 2011, the Secretariat convened a Consultancy meeting to develop a revised version of the Guidance on the Import and Export of Radioactive Sources.

An open-ended meeting of technical and legal experts was held in May 2011, attended by 155 experts from 82 Member States and 3 international organizations. The experts reached a consensus on a draft revised Guidance. The amendments to the Guidance were not so significant, either individually or in aggregate, as to necessitate a new political commitment by those States which had previously notified the Director General of that commitment. The meeting recommended that the IAEA policy-making organs endorse the amended Guidance without requiring a recommencement of the political commitment process.

A copy of Mr Mansoux’s presentation was posted on the TRANSSC 22 web page.

2.2.3 Fukushima

The Japanese TRANSSC representative, Mr Iwasa, expressed Japan’s deep appreciation for condolences and assistance received from Member States and International Organizations following the Fukushima accident. He also briefed the meeting about the nuclear power plants’ status and radiation monitoring situation. A detailed report, available on the website of the Japanese prime minister’s office, will be presented at the Ministerial Conference in Vienna the following week.

Mr Stewart introduced statements from Mr. Kojima, the Japanese TRANSSC member, which included a report on the general situation in Japan. There were no transport accidents resulting from the earthquake and tsunami, or impact on spent fuel storage casks at Fukushima site.

Mr Hirose, WNTI representative and representing the Nuclear Fuel Transport Co. LTD of Japan, presented an overview of the Fukushima accident and its impact on transport including screening inspections on vessels and freight containers. He concluded that there would be no immediate impact on the current TS-R-1 revision, but internationally consistent emergency measures for transport of goods other than radioactive material should be established. He explained that screening inspections in Japan were being conducted on a voluntary basis in response to the question from Mr Sarkar, Australia. Mr Sallit, UK, supported the need for internationally harmonized criteria on screening inspections.

Mr Stewart explained cooperative measures among International Organizations following the Fukushima accident. Ms Rooney, ICAO and Mr Rahim, IMO informed the meeting of activities in their respective organizations and that they would provide proposals in the Ministerial Conference the week of June 20.

Copies of Mr Iwasa’s statement and Mr Hirose’s presentation were posted on the TRANSSC 22 web page.
2.3 Review of previous meetings

2.3.1 Report of 4 Chairs meeting

Mr Brach provided an overview of meetings in January and May 2011 of the four Safety Standards Committees Chairs (NUSSC, RASSC, WASSC and TRANSSC) held since the last TRANSSC meeting in November 2010. The Chairs meet typically before each CSS meeting and additionally once or twice during the year depending on topics and the need for coordination among the four committees. The January meeting evolved into a joint meeting with the co-sponsoring organizations involved in the revision of the Basic Safety Standards, the BSS. The Chairs, the BSS co-sponsors and Secretariat reviewed the final draft of the BSS to confirm that the agreed upon changes resulting from the November/December 2010 Safety Standards Committee meetings and the Technical Editor changes were appropriately included in the final draft of the revised BSS. The Chairs also provided comments on proposed revisions to SPESS and the Step by Step Manual that were subsequently posted on the IAEA web in March 2011; and, the Chairs concluded that the current process for the review of safety standards by the four Committees, CSS and Member States is sufficient and that an additional independent review is not needed. This latter discussion was prompted by a CSS Action Item to consider if an additional independent review is needed.

The May Chairs meeting included the outgoing and incoming Chairs of NUSSC, RASSC and WASSC and the TRANSSC Chair. The May meeting included: 1) Discussion on the process for revising definitions in safety standards. The Chairs were requested, when possible, to identify any definition changes early in the development process and to prepare a short, half-page explanation and justification for each change to be brought to the Chairs and CSS meetings. 2) The Chairs coordinated the presentation of the four Committees’ three-year term reports for the May CSS meeting. 3) The Chairs discussed suggestions from the September 2010 CSS meeting to better control the development of future safety standards by, for example, making the standards more technology neutral and increasing the use of lower level documents (such as TECDOCs and Safety Reports) to contain details not necessary to be included in safety standards. 4) There was an information briefing for the Chairs on recent ICRP findings on recommended dose limits for lens of the eye. 5) The Secretariat presented a status report on the pilot test of the IAEA draft procedure for a new system to evaluate feedback on the use of IAEA safety standards. The pilot test will require about 2 years.

2.3.2 TRANSSC Chair report to CSS 39

Mr. Brach provided an overview of his TRANSSC presentation at the CSS May 2011 meeting. The presentation provided a brief overview of the TRANSSC 21 November 2010 meeting, and an overview of the TRANSSC Three Year Term Report for 2008-2010. Mr Brach informed the CSS that approximately 33% of the TRANSSC members for this new term are new to TRANSSC, and that a TRANSSC orientation and induction session will be included in the June TRANSSC meeting for all new and returning TRANSSC members. Mr Brach also identified a CSS action item from the May meeting that is directed to TRANSSC. CSS asked the Secretariat and TRANSSC to consider a change in the use of the term, Special Arrangements. The request is based on a concern that the term, “Special Arrangement,” conveys a message to the public of a relaxation or reduction in safety requirements and does not convey to the public the rigor of review and safety determinations.
made by the regulator in authorizing the transport. The CSS action item will be discussed during the review of TS-R-1 later on the TRANSSC 22 meeting agenda.

A copy of Mr. Brach’s CSS presentation was posted on the TRANSSC 22 web page.

**2.3.3 Report of CSS 29 and Joint AdSec/CSS Task Force**

Mr Delattre, Scientific Secretary of CSS, presented the reports of the 29th CSS meeting held from 25 to 27 May 2011. A presentation was made by Japan on the events in Japan and the Fukushima Daiichi accident. There was also a joint presentation made by Ms E. Buglova, Mr P.S. Hahn and Mr M. Lipar on the IAEA response. The CSS also discussed the implications of the Fukushima accident on the IAEA Safety Standards. The CSS agreed with the Secretariat’s proposal to continue the publication of the recently endorsed drafts as well as other drafts in the review process.

The following Safety Requirements and Guides were endorsed:

- **DS414**, Safety Requirements, Safety of Nuclear Power Plants
- **DS 379**, revised BSS, Draft 5.0, The Secretariat is to launch a 30 day consultation of Member States on a revised Schedule III of DS379 that incorporates the new ICRP dose limits for the lens of the eye, and the Chair of the CSS will endorse the final text of Schedule III after consultation of the outgoing and incoming RASSC Chairs on their assessment of the Member States comments.
- **DS351**, Draft Safety Guide on The Use of a Graded Approach in the application of the Safety Requirements for Research Reactors endorsed by the CSS
- **DS405**, Draft Safety Guide on Volcanic Hazards in Site Evaluation for Nuclear Installations
- **DPP DS450** for a Safety Requirement on Decommissioning and Termination of Activities, revision of WS-R-5 endorsed by the CSS
- **DPP DS452** for a Safety Guide on Decommissioning of Nuclear Installations, combination of DS402 and DS404
- **DPP DS441** for a new Safety Guide on Construction of Nuclear Installations

The CSS also discussed the following important topics: 1) Feedback from the CNS review meeting, 2) Three year reports of the four Safety Standards Committees, 3) Future areas of work, input from the Secretariat and Committees, including the need for an action plan on
the feedback from the Fukushima accident, 4) Preparation of the CSS four year report, 5) Revision of the Terms of Reference of the CSS for the next term, and 6) Progress report on the pilot study for the newly proposed feedback and review/revision process.

The day before the CSS 29th meeting, the Joint AdSec CSS Task Force met to discuss and finalize the Task Force recommendations to improve the interface of safety and security programs and document development processes. Mr Delattre provided TRANSSC a brief summary and overview of the Task Force meeting. At the Joint AdSec CSS Task Force meeting the following four principles were agreed upon:

- Nuclear security and nuclear safety are equally important and the process for review/approval should reflect this.
- Nuclear Safety DPPs and Nuclear Security DPPs should be reviewed to identify/define interfaces, if any.
- Draft Nuclear Safety documents and draft Nuclear Security documents that have an identified interface should be developed in consultation.
- After implementation of points 2 and 3, draft Nuclear Safety documents and draft Nuclear Security documents should be reviewed and approved to ensure the coordination has been effective and that they are in accordance with the Nuclear Safety Fundamentals and the Nuclear Security Fundamentals.

2.3.4 TRANSSC Action Record Sheet

Mr Stewart presented the TRANSSC Action Record Sheet (Annex 4) that recorded the status of action items resulting from previous TRANSSC meetings. Mr. Stewart proposed that the TRANSSC Action Record Sheet for the new TRANSSC term be revised to only include presently open actions items from previous meetings. Mr. Stewart’s proposal was accepted and TRANSSC determined that three outstanding action items from previous TRANSSC meetings should be carried forward for the new term, 2011-2013. The three items (T18.6, T19.2, and 20.4) are identified on the new TRANSSC Action Record Sheet posted on the TRANSSC 22 web page.


2.4 Other Administration Items

2.4.1 TRANSSC Induction

Ms Varley presented the TRANSSC induction document that was developed to assist new members gain an understanding of the activities and functions of TRANSSC.

A copy of Ms Varley’s presentation was posted on the TRANSSC 22 web page.

2.4.2 SPESS Introduction

Mr Delattre introduced the IAEA procedure, Strategies and Processes for the Establishment of IAEA Safety Standards (SPESS) that guides the Secretariat’s and the Safety Standards Committees in the development and review of IAEA safety standards. His presentation
provided a history of the safety standards, the process for their establishment and review, and information about the safety standards committees.

Mr Delattre noted that a copy of the SPESS procedure, the associated Step-By-Step Manual for implementation of SPESS and the procedure providing Guidance for Drafters are all available on the TRANSSC web page under the drop down URL, “SPESS Folder.”

2.4.3 Transport Overlay on SPESS

Mr Stewart provided an overview of how the periodic review and revision of the transport safety requirement, TS-R-1, and the six associated transport safety guides follow the IAEA process for development of safety standards described in the SPESS procedure. The current revision of TS-R-1 is a good example of how the IAEA process can support the timely review and approval of revisions to safety standards. The TS-R-1 20XX Edition is presently on schedule to be completed and approved by the Board of Governors within two years of the CSS’ approval of the DPP for the TS-R-1 20XX Edition.

A copy of Mr Stewart’s presentation was posted on the TRANSSC 22 web page.

2.4.4 Orange Book Training

Mr Friedrich Kirchnawy, a long standing TRANSSC member from Austria made a presentation to provide participants with a better understanding of the Orange Book. He presented the history, principles, implementation and content of the Orange Book. He talked about the Sub-Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals of the United Nations Economic and Social Council. The 2 Subcommittees meet twice a year. An holistic overview, coordination and harmonization of the various UN organizations and their respective responsibilities in drafting and developing regulations for all modes of transport for the Orange Book was given in much detail. The Orange Book also contains a table of correspondence between paragraph numbers in TS-R-1 and the recommendations on the transport of dangerous goods.

A copy of Mr Kirchnawy’s presentation was posted on the TRANSSC 22 web page.

3.0 TRANSSC WORK NOW AND IN THE FUTURE

3.1.1 Transport Unit Plans 2011-2013

Mr Stewart provided an overview of the Transport Safety Unit authorized program and activities for the next three years, 2011- 2013. He noted especially the markedly reduced number of authorized Technical Meetings and Consultants Meetings. Further he highlighted that certain work activities have already been planned and budgeted for the Unit. Under the new TRANSSC Terms of Reference for the 2011- 2013 term, TRANSSC is to advise the IAEA on areas for improvement and focus in transport program. Mr. Stewart’s presentation was very timely for TRANSSC awareness considering that the next item on the TRANSSC meeting agenda focuses on TRANSSC plans and activities for the next three years. Mr. Brach stated that in his role as Chair, a responsibility and challenge he and Mr. Stewart would have is to achieve harmonization with the TRANSSC three year work plan and
necessary revisions to the Transport Safety Unit planned activities and authorizations for 2011-2013.

A copy of Mr Stewart’s presentation was posted on the TRANSSC 22 web page.

3.1.2 Three Year Report Forward Look

Mr Brach stated that the objective in developing a three year work plan is to provide direction and predictability to planned TRANSC actions. The plan should be envisioned as a living document that will be revisited at each TRANSSC meeting and be subject to revision as TRANSSC may determine. Mr Brach provided a brief summary of the list of actions and challenges in the TRANSSC Three Year Term Report 2008 – 2010 to use as a starting point in the development of a TRANSSC three year working plan. This list was developed in TRANSSC 20 and 21. During the discussions, many more candidate actions were proposed by TRANSSC members, including actions that respond to the CSS Action Item 29.7 to address the issue on the use of the term “special arrangement” in TS-R-1. Mr Brach committed to prepare a revised list of candidate actions and to provide the list to TRANSSC members for consideration and prioritization. Mr Brach will then prepare a draft “working plan” in advance of the next TRANSSC meeting in October 2011 for discussion and decision.

TRANSSC ACTION: TRANSSC CHAIR TO PREPARE A REVISED LIST OF CANDIDATE ACTIONS FOR THE THREE YEAR WORKING PLAN AND PROVIDE IT TO MR. STEWART BY THE END OF THE MEETING.

(ACTION COMPLETED JUNE 16, 2011)

TRANSSC ACTION: TRANSSC CHAIR TO PROVIDE DRAFT TRANSSC WORKING PLAN TO TRANSSC MEMBERS IN ADVANCE OF TRANSSC 23 MEETING (OCTOBER 2011)

3.1.3 CSS Forward Look

The AdSec CSS Task Force recommended that the long term structure should include a new Safety and Security Series Commission with both the safety and security expertise and a set of Committees to cover the technical aspects of the safety and security series of publications, including a new Nuclear Security Guidance Committee (NSGC). In the intermediate phase, the NSGC and the four existing Safety Standards Committees will be complemented by an “Interface Group” (probably the meeting of the Chairs and additional senior experts) to reviews DPPs and drafts and refer them to the appropriate Committees for their review. The Safety Standards Committees will continue to report to the CSS and the NSGC will report to the DDG who will decide which further consultation is deemed necessary.

3.1.4 Open Discussion
The discussion and TRANSSC recommendations for next steps in the consideration of the TRANSSC three year working plan are summarized under Para 3.1.2 above.

4.0 THE DEVELOPMENT OF DOCUMENTS/PRODUCTS

4.1.1 DS 437 TS-R-1 for approval to send to CSS

Mr YK Zhao introduced the overview of revision of TS-R-1 and the progress made since TRANSSC 21. Over 360 comments during 120-day period were received. These comments were addressed by TRANSSC 21 and consultants meetings. Resolution of the 120-day comments was incorporated into draft 2.4. An additional 140 comments on the resolutions of 120-day comments and draft 2.4 were received. These comments focused on issues of fissile excepted material, documentation, transitional arrangements and exemption of radioactive material. Mr Zhao explained the editorial changes and the proposals made by IATA regarding the documentation of transport of radioactive material as queried by some member states.

Working methods were discussed first. And then the meeting discussed the comments one by one in the plenary.

The conclusions were recorded in “TRANSSC 22 Conclusions regarding Comments on Draft 2.4 of TS-R-1 20XX Edition and Resolutions on 120 Days Comments” (Annex 5).

IATA’s proposals were identified as an issue by TRANSSC 20. However, no resolution of the issue has been reached. TRANSSC 22 was asked to discuss this issue further. Some participants concerned that these requirements are specified in modal regulations that may not be suitable to member states if the member states adopted the IAEA Regulations. IATA pointed out that this is the safety issue and these requirements exist in Orange Book and air transport instruments. The meeting agreed that in light of harmonization, the paragraphs proposed by IATA will be accepted and incorporated in TS-R-1.

Plenary had lengthy discussions about the exemption of instruments and articles (footnote (h) of Table 2). Some members stated that it is not justified to establish a procedure to define a different exemption values for a particular case (Kr-85, H-3, Th-228 and Th-232 in lamp industry). In addition, there is no requirement proposed regarding the approval procedure itself which makes it rather complicated to achieve harmonized implementation in practice. Some member states said this is a practical issue that is often met. Consequently, it was deemed urgent to find a solution and that the solution should not compromise the safety of transport of such material. A proposal by Germany to move the footnote (h) of Table 2 to paragraphs and to extend the scope of the exemption to all articles and instruments was discussed. A working group was established to review the possible incorporation of the proposal by Germany in TS-R-1 20XX Edition. The plenary then decided by voting that alternative requirements for exemption values of instruments and articles are accepted as presented in the German proposal for change and confirmed by the working group. The chairperson expressed his concern about the decision by the plenary since it is not a normal procedure for TRANSSC at the last minute to add such new paragraphs without systematic review. Some member states shared the chairperson’s concern; however the clear majority of TRANSSC supported the German proposal for change. DS 437 Draft 2.43 TS-R-1 20xx (Annex 6).

4.1.2 TS-G-1.1
TRANSSC agreed that the content of TS-R-1 and TS-G-1 needs to be consistent. The review and publication of the safety guide has a slightly different process compared to that of a safety requirement. TS-R-1 requires approval by all the Safety Standards Committees, CSS and then approval by the DG and the Board of Governors (BOG). A safety guide requires the same sequence of approvals but does not require approval by other SSCs and the BOG. In this regard publication of the TS-G-1.1 does not require as long a period as the TS-R-1. TS-G-1.1 will need to be revised to incorporate the changes to TS-R-1 as approved by TRANSSC 22 and will be included as an agenda item for final approval at TRANSSC 23.

4.1.3 TS-G-1.2 Varley

A note verbal was sent out to invite participants to a Technical Meeting to Prepare an Updated Draft of the Safety Guide Planning and Preparing for Emergency Response to Transport Accidents involving Radioactive Material (TS-G-1.2). The meeting is held virtually via connection to the Internet. The purpose of the meeting is to review the current Safety Guide and to prepare draft operational emergency response guides/manuals (graded approach) as standalone documents to be issued as lower tier documents (e.g., technical reports) suitable, in the long-term, for incorporation as annexes or appendices in the revision of TS-G-1.2. Over 50 nominations for participants in the TM were received.

In light of General Conference Resolutions with respect to enhancing cooperation and communication for emergency preparedness and response planning between coastal and shipping states, 4 consultants meetings were convened since 2008. The resultant guide entitled “Guidance for the Emergency Response by Coastal States to Accidents on Vessels Carrying Radioactive” was used as the base document for this TM. The purpose of the TM is to develop similar guidance for land and air mode.

4.1.4 TS-G-1.3 Varley

A CS was held in June 2010 to review the existing Safety Guide on Radiation Protection Programmes for the transport of radioactive material (TS-G-1.3, 2007 Edition) and evaluate the necessity of a revision, as BSS (1996 Edition) and TS-R-1 (2009 Edition) were being revised. The modifications made in the BSS (draft 3.0) and the TS-R-1 (2009 Edition and draft for 20XX Edition) did not justifying a revision at this stage. The CS recommended that the review and revision of TS-G-1.3 should only be decided after the publication of both BSS (publication estimated for 2011/2012) and TS-R-1 20XX Edition.

4.1.5 TS-G-1.4

Mr Stewart provided a brief update on the Agency’s plans to revise and as appropriate consolidate all “management system” guidance into one safety guide. He cautioned that TRANSSC should note that the IAEA’s use of the term management systems is being broadened to encompass much more than quality assurance and quality control, and TRANSSC should be aware of this expansion of the term if/when TS-G-1.4 is considered to be included the consolidated guide. Mr Brach noted that in previous meetings of the Committee Chairs, he specifically raised a concern on consolidating TS-G-1.4 into the larger guide applicable to all nuclear power programs, fuel conversion and fabrication facilities, research reactors and other industrial applications. The “user friendliness” of the guides must be considered, such as in the case of transport with so many entities involved that are not necessarily part of the larger nuclear power industry. The four Chairs agreed that TS-G-1.4 should remain separate for the transport industry.
4.1.6 TS-G-1.6 Zhao

Mr YK Zhao informed TRANSSC that the DDP of TS-G-1.6 for 2009 Edition of TS-R-1 was approved by CSS 29 in May 2011. The draft of the TS-G-1.6 for 2009 Edition of TS-R-1 will soon be submitted to member states for 120-day comments. Due to the delay resulting from rescheduling the May CSS meeting, the deadline for 120-day comments will now be the week before next TRANSSC. As a result the final draft of TS-G-1.6 would not be available for approval by TRANSSC 23 in Oct. 2011. A member state expressed its concern about the structure of the schedules. These concerns will be addressed during 120-day comment period.

4.1.7 Update on Schedules Zhao

Mr YK Zhao introduced the new features of the e-schedules. Many participants commended the Agency’s work and suggested that the software should be tested systematically and transport experts should be getting involved in the development of the software. The e-schedules are expected to be available when the TS-G-1.6 for 2009 Edition is published.

4.1.8 Update on Self-Assessment Tools (SAT)

Self-Assessment is an organization’s internal process designed to review its current status, processes and performances against pre-defined criteria and thereby identify key elements for further development and improvement*. IAEA methodology for self-assessment is comprised of question-sets derived from the IAEA Safety Standards and Safety Guidance. Editor software facilitates question-set design, development and updating. Software facilitates implementation of self-assessment by MS and highlights priority areas for improvement. Over time, the member state can build a permanent record of compliance status, including supporting evidence and documentation, embedded in a SAT report. Fully editable SAT Report may be archived in an untameable format. SAT data is compatible with IAEA RASIMS and RAIS programs. SAT is valuable in preparation for advisory missions such as IRRS. Every question is derived on the basis of either the Safety Requirements or the Safety Guides of IAEA. Areas which are covered by GS-R-1 would not be included unless they were specifically relevant to transport of radioactive material. 12 Chapters of TS-G-1.5 were used as the foundation of the question sets. In preparation for an IRRS follow-up mission, Canada has been provided with SAT questions. The SAT web site launch is proposed to take place in July 2011.

4.1.9 Technical Basis of Regulations Zhao

Mr Y Zhao introduced the project on the technical bases of the transport regulations. The primary purpose of the project was to identify technical bases and essential background information for the safety requirements as prescribed in the current regulations. This ensures that a historical record of the grass roots of safety issues be preserved and the knowledge can be transferred to responsible persons in future generations. In essence this project will help users understand the Regulations better that would certainly lead to improvement and effective implementation of the Regulations. Further, when changes to TS-R-1 are being considered, information on the original basis for the requirements will help TRANSSC assess the need for and appropriateness of the proposed change.

The member states and TRANSSC members were asked to support this project. ICAO expressed its supports and hopes that good corporation with the Agency is developed. Some member states also believed that this is a good project and made some good suggestion
including providing some documents that may be used to provide the technical basis for the requirements in TS-R-1.

4.2 DPP Approval

In light of the time constraints, DPP’s on the two Safety Guides were approved as there was no comment from TRANSSC. Two planned Safety Requirements were presented for TRANSSC consideration.

4.2.1 DS 453 Occupational Radiation Protection

No TRANSSC member comments were posted on the draft DPP, DS 453, prior to TRANSSC 22. The DPP was accepted and approved by TRANSSC without further discussion on the planned safety guide.

DS453 APPROVED BY TRANSSC

4.2.2 DS 455 Establishing a National Radiation Safety Infrastructure

No TRANSSC member comments were posted on the draft DPP, DS 455, prior to TRANSSC 22. The DPP was accepted and approved by TRANSSC without further discussion on the planned safety guide.

DS455 APPROVED BY TRANSSC

4.2.3 DS 456 Leadership and Management

Ms Monica Sagge provided an overview of the planned development and revision of Safety Requirement GS-R-3. No TRANSSC member comments were posted on the draft DPP, DS 456, prior to TRANSSC 22. There were no TRANSSC comments or requests for change to the draft DPP following Ms Sagge’s presentation. The DPP was accepted and approved by TRANSSC without further discussion on the planned safety requirement document.

A copy of Ms Sagge’s presentation was posted on the TRANSSC 22 web page.

DS456 APPROVED BY TRANSSC

4.2.4 DS 457 Preparedness and Response for a Nuclear or Radiological Emergency

Ms Elena Buglova provided an overview of the planned development and revision of Safety Requirement GS-R-2. No TRANSSC member comments were posted on the draft DPP, DS 457, prior to TRANSSC 22. There were no TRANSSC comments or requests for change to the draft DPP following Ms Buglova’s presentation. The DPP was accepted and approved by TRANSSC without further discussion on the planned safety requirement document. A copy of Ms Buglova’s presentation was posted on the TRANSSC 22 web page.

DS457 APPROVED BY TRANSSC
4.3 and 4.4 There were no actions requested of TRANSSC to review/approve draft Safety Standards documents other than DS 437, TS-R-1 20XX Edition that was addressed under agenda item 4.1.1.

4.5 Information from other UN/International bodies on their documents

Meeting was informed of developments from other UN bodies present. Ms Rooney, ICAO highlighted activates of interest for TRANSSC. It was mentioned that new edition of TS-R-1 may possibly be included in the 2015 edition of the Technical Instructions. Mr Rahim, representing IMO expressed sympathy and condolences to the Government and the people of Japan with respect to the recent natural tragedies faced in the country. IMO offered support as and when required. Mr Rahim also reminded the meeting of the e-learning package developed by IMO and encouraged participants to take advantage of this use.

The Secretariat welcomed IMO’s paper and the full paper is available as Annex 7.

5.0 THE DEVELOPMENT OF IAEA SECURITY DOCUMENTS

5.1 Nuclear Security Update

Ms Erikson-Eklund gave a brief update on Nuclear Security activities. New thresholds and security provisions have been accepted by the UN Committee of Experts and will be incorporated in the next edition of the Orange Book. Information on recommendations documents, assessment missions and training was provided.

A copy of Ms Erikson-Eklund’s presentation was posted on the TRANSSC 22 web page.

6.0 DENIAL OF SHIPMENTS

6.1 Update on Denial and Delay

The update on Delay and Denial of Shipment summarized developments that took place since TRANSSC 21 meeting, notably the 6th ISC-DOS and the consultant services meetings. A copy of Mr. Schwela’s presentation was posted on the TRANSSC 22 web page.

7.0 Transport Conference

7.1 Mr Stewart provided an overview of the International Conference on the Safe and Secure Transport of Radioactive Materials: The next 50 years that will be held in Vienna, Austria 17-21 October 2011. The conference will in part recognize the outstanding safety record achieved in the world-wide transport of radioactive materials over the past 50 years since the first issuance by IAEA of the transport regulations in 1961. However the main focus of the conference will be on the challenges ahead in assuring the safe and secure transport of radioactive materials, the challenges raised as additional countries embark on nuclear power programs and the increased world-wide use of radioactive materials in industrial and medical applications.

A copy of Mr Stewart’s presentation was posted on the TRANSSC 22 web page.

8.0 Other Business

8.1 WASSC/TRANSSC Interface
A joint WASSC/TRANSSC activity "Joint Working Group for an Integrated Transport and Storage Safety Case for Dual Purpose Casks for Spent Nuclear Fuel" was formed. The chairman of the working group, Mr. B. Droste, reported on the terms of reference and the results of the first Technical Meeting TM-40975 that took place at the IAEA 4-8 April 2011. The WG is to develop a TECDOC on guidance material for a harmonized safety case considering transport, short and long term storage, and transport after storage of spent nuclear fuel in dual purpose casks. A first draft of the TECDOC, using the template and text of the European Guide for Package Design Safety Analysis Reports, was prepared, which will be refined by correspondence groups before the next plenary meeting of the working group scheduled 16-20 April 2012.

A copy of Mr. Droste’s presentation was posted on the TRANSSC 22 web page.

8.2 (a) “Regulatory Control of Consumer Products”

Mr. Colgan reported that a topical session “Regulatory Control of Consumer Products” will take place during the forthcoming RASSC 30 meeting 27-30 June 2011. Based on discussions during the development of the revised BSS, this topic was highlighted in the RASSC three-year report as a priority issue for the 2011-2013 terms. Presently the regulatory control of consumer products is referred to in a number of IAEA safety standards but there is no single document which addresses all aspects of the life cycle of such products, including justification, exemption, transportation, recycling, disposal and the application of a graded approach. A number of presentations will be made at the RASSC meeting and, following discussion, the advice of RASSC will be sought on the importance of this issue, what priority should be given to it within the Secretariat and what specific actions should be taken.

Mr Colgan agreed to keep TRANSSC fully informed of the advice received from RASSC and any subsequent actions. He also noted that, in the event that a safety guide is to be developed, the DPP would be submitted to TRANSSC for approval.

In response to a question from Italy, Mr Colgan indicated that during the forthcoming RASSC/WASSC meeting, there would be an initial discussion on the implication for the safety standards of the recent accident at Fukushima. It was anticipated that a number of issues would be identified for further consideration at future meetings, one of which might be exemption levels for contaminated commodities.

8.2 (b) Animations

The TRANSSC member from Iran provided the Secretariat a disk with multiple animated sketches planned for use in Iran to raise general public awareness and to educate the general public on radioactive materials including the transport of radioactive materials. Two of the short 2 - 3 minute animated sketches were presented to TRANSSC 22 at the end of the meeting.

9.0 Agenda for TRANSSC 23

Mr Brach noted that a few topics have already been identified for discussion at the next TRANSSC meeting in October 2011, including review of revisions to TS-G-.1.1 to conform to TS-R-1 20XX Edition, TS-G-1.2 on emergency preparedness, and development of a three
year work plan for TRANSSC for the new term 2011-2013. Mr Brach invited TRANSSC members to submit any additional suggestions for the TRANSSC 23 agenda to him and Mr Stewart.

10.0 Review of Draft Meeting Report

Mr Brach stated that due to the lengthy TRANSSC meeting, the Secretariat did not have time to prepare a draft TRANSSC 22 meeting report. He stated that the Secretariat will strive to have the report posted for TRANSSC member review within the next two weeks.

Mr Stewart led the review and discussion of the TRANSSC 22 decisions, approvals and action items. TRANSSC 22 accepted the list as accurate and complete.

TRANSSC 22 list of decisions, approvals and actions was posted on the TRANSSC 22 web page.

10.1 Closing Remarks

Mr Brach provided closing remarks for TRANSSC 22. He briefly highlighted the TRANSSC 22 actions to approve TS-R-1 20XX Edition to move forward to CSS for final approval, and approval of four DPPs. He also summarized the TRANSSC actions in response to the CSS action item to address the issue raised by the CSS representative from Canada on the use of the term “special arrangement” in the safety standards on transport safety (CSS Action Item 29.7). Specifically, TRANSSC included two actions for consideration in the development of the three year working plan for 2011-2013 that address the CSS Action Item.

The actions include consideration to identify the requirements necessary to support Competent Authority review and approval of large components as an integral element of TS-R-1 vice the current use of Special Arrangements and consider if additional safety guidance is needed to support regulatory review and approval of the transport of large components. In addition, TRANSSC will consider if changes to the current requirements related to Special Arrangements and associated guidance is needed.

Mr Hahn, Director, Division of Radiation, Transport and Waste Safety, thanked TRANSSC for a very productive meeting and thanked the TRANSSC members for engaging and strongly supporting the meeting discussions which on multiple days ran well beyond the planned evening closing time and even extended to the mid-afternoon on Friday.

Mr Hahn and Mr Brach thanked all attendees for their active participation and wished all a safe journey home. Mr Hahn then formally closed TRANSSC 22.
Good Morning Ladies and Gentlemen,

I am pleased to welcome each of you here to Vienna today (in particular those of you who are new to this committee), and to formally open the twenty second meeting of the Transport Safety Standards Committee (TRANSSC). This meeting is the first meeting of your 2011 to 2013 term. You are also the first of the four committees to meet for this term, so this is the really the first working day of the new term.

Let me thank you all for offering to provide your time to support this work, the IAEA is not simply the people who work in this building it includes the people in all of the Member States that support the work. On behalf of the secretariat let me welcome you to the work of the IAEA, and indeed, as a long standing member myself, I should welcome you to what has become known as the Transport Mafia.

While “Transport Mafia” is a term that involves some humour there is also a serious reason behind it. The transport community has always been a group that has worked closely together over national borders, even despite differences. To those of you who are newcomers you will find the experienced people here very willing to work with you, both to help you and to listen to you.

A good example is the training you will be receiving today on the Orange Book, where one of the more experienced members in this subject will share their knowledge with you. I trust you will all continue in the spirit of mutual support, that has been the “signature” of transport over so many years. In this respect I am pleased to let you know that there are currently projects being designed for Technical Cooperation that are intended to support your co-working in the area of transport.

Moving on to the work of this meeting; you will be aware that the Agenda for this meeting has a very important subject:

- Addressing Member State comments for TS-R-1 and approving the final draft.

The process of revision of TS-R-1 has several steps, as set out in the SPESS manual. We do not, and should not, attempt to do everything at once. In order to assist you in knowing what is expected in this meeting we will be explaining the processes to you today.

Welcome to Vienna. I wish you all a very productive meeting. I hope you will not only take the time to work hard, but you will spend time in the events we have organised getting to know each other.

Now I would like to introduce Mr William Brach of the United States of America, the returning chair of TRANSSC, and to thank him for accepting the invitation to continue as chair for another three years. You have a very heavy workload ahead of you this week and I am confident that under the leadership of Mr Brach, it will be possible to achieve the intended results.

Thank you.
OPENING REMARKS FOR THE 22nd MEETING OF THE TRANSPORT SAFETY STANDARDS COMMITTEE (TRANSSC) BY BILL BRACH

I want to “Thank” Mr Al Khatibeh for opening the meeting and for his summary of important items for our discussion and action at this TRANSSC meeting. Thank you.

I want to welcome everyone to our TRANSSC 22nd committee meeting.

I especially want to welcome all the Member State representatives and delegation members who are joining us this week for their first TRANSSC meeting. I am pleased to see and meet so many new participants in TRANSSC. Likewise, I am also very happy to see and welcome the returning TRANSSC members.

For the new TRANSSC term, 2011-2013, 44 Member States have nominated members to TRANSSC. Approximately one third of the TRANSSC members for this new term are new to TRANSSC. Some of you are probably wondering: What is TRANSSC? What does the committee do? What process is followed for review and revision of TS-R-1 and how does TS-R-1 fit into the agency’s safety standard program? I recall some years ago when I attended my first TRANSSC meeting I had a lot of questions such as these and a lot more. The long list of new acronyms can be quite confusing. Our propensity to use an acronym as a word that you will not find in an English dictionary only adds to the confusion. I encourage everyone to ask questions or ask for clarification if I or others make a statement or comment that you do not understand or if we slip into using acronyms as words and the acronym or phrase is not familiar to you.

To help new TRANSSC members, and perhaps serve as a refresher for others, we are introducing a new item on the TRANSSC agenda for this meeting. This afternoon will be dedicated to providing an overview or training session on the roles and responsibilities of our TRANSSC committee, on the IAEA safety standards development process and how TRANSSC fits into the IAEA process. We have also included a training session on the UN Model Regulations – Recommendations on the Transport of Dangerous Goods (commonly referred to as the UN Orange Book). The UN Orange Book training session at this June meeting was requested at our last TRANSSC meeting. I note that the timing of this training session is very fortunate in that it is available at the beginning of the term for all the new TRANSSC members. I especially want to “Thank” Mr. Kirchnawy, our TRANSSC member from Austria who graciously volunteered to provide the UN Orange Book training. “Thank you Mr. Kirchnawy.”

We have a number of very important topics on our agenda for this meeting. First and foremost is our need to review and agree on the disposition and closure of all Member State comments, TRANSSC member comments and others’ comments on the proposed revisions to TS-R-1, 20XX Edition. The Transport Safety Unit has developed a process for us to follow to reach resolution of the 300+ Member State comments and the additional comments on the proposed changes to TS-R-1. Simply stated, the goal of this process and our TRANSSC goal is to develop a clear and documented record of the TRANSSC accepted disposition of all the comments in reaching an agreed upon final revision of TS-R-1. Consistent with the previous TRANSSC preference, we plan to address and resolve all comments in plenary, but breakout/working group rooms will be available if certain
comments warrant special focused review and recommendation for final TRANSSC disposition.

An additional and new meeting agenda topic I want to highlight is our discussion of future work activities for TRANSSC and the Transport Safety Unit to address in the next three years. I will be providing a brief overview of the TRANSSC Three Year Term Report for 2008 – 2010. In that presentation, I will summarize the list of future work challenges and activities that were developed in our two TRANSSC meetings last year. Then under agenda item 3.1.2, we will be coming back to that list of future work activities that we will use as a starting point to develop a three-year work plan. I want to emphasize that the list is a starting point and I will be looking to you to provide comment and input as we try to develop our list of priority work we should accomplish in the next three years. I also want to clarify that the purpose of this effort is not to lock us in place with a three-year plan; rather, the effort should help provide focus, direction and predictability to our planned activities for the next three years. I envision that at future TRANSSC meetings we would briefly review the status of the three-year plan and update and revise it as TRANSSC may determine.

On a personal note, I want to “Thank” the Agency for asking me to continue as TRANSSC Chair for the next three years. I am much honored to serve you in this capacity. I especially want to “Thank” each of you for your support the past three years. I have made my share of mistakes serving as Chairman, maybe more than my share. But I want you to know that I am most appreciative of your patience with me and I ask for your continued support. I also want to Thank Mr. Stewart and the Transport Safety Unit for their patience and outstanding support.

Thank you! Thank you all!

We have a full agenda for our meeting this week. Clearly, our most important task is the review and approval of the final revisions to TS-R-1, 20XX Edition. This agenda topic will take priority and we will dedicate the time necessary to complete our review of TS-R-1. As a consequence, some agenda items may slip to either our next meeting, TRANSSC 23; or depending on the issue, we may need to use electronic communications, or email correspondence, to close TRANSSC action or decision on the topic. As we proceed through the meeting agenda we will identify any topics that may need to be deferred.

So I believe that, if you all are ready, we can now move to our next agenda item, item 2.1, which is review and approval of the TRANSSC 22 meeting agenda.

Thank you!
Annex 3

TRANSSC 22
TM-40447

IAEA Headquarters, Vienna
14 June – 17 June 2011

Item 2.1.1
AGENDA
## TRANSPORT SAFETY STANDARDS COMMITTEE (TRANSSC)
### MEETING OF TRANSSC 22

**IAEA Meeting Room (Board Room A)**

**Agenda**

**Date:** 14 June – 17 June 2011

**Start:** 9:30

### 1.0 OPENING SESSION

**Tuesday 9:30-10:00**

**Purpose**
- To Welcome Participants
- To provide TRANSSC Direction for the Meeting

#### 1.1. Opening Remarks

1. DDG D FLORY
2. Chair B BRACH

**Output Required**
- None – For information only

### 2.0 ADMINISTRATION ITEMS

#### 2.1 Tuesday 10:15-10:45

#### 2.2 Tuesday 10:45-11:45

#### 2.3 Tuesday 11:45-12:15

#### 2.4.1-2.4.3 Tuesday 13:30-15:00

#### 2.4.4 Tuesday 15:30-18:00

**Purpose**
- To establish a clear set of guidelines for the conduct of TRANSSC
- To adopt the agenda
- To inform TRANSSC of the Administrative arrangements
- To make people aware of key discussion topics
- To provide follow up to previous meetings and related administrative matters

#### 2.1. Conduct of the Meeting

1. Agenda – B BRACH
2. Terms of Reference – B BRACH
3. Administrative Meeting Arrangements – J STEWART
4. Previous meeting report – B BRACH

#### 2.2. Topical briefing

1. 2008-2011 Overview – B BRACH
2. Code of conduct import export guide – H MANSOUX
3. Fukushima – Japanese representative

#### 2.3. Review of previous meetings

1. Report of the 4 chairs meeting – B BRACH
2. Chair report to CSS – B BRACH
4. Action record sheet – J STEWART
### 2.4. Other admin items

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>TRANSSC induction – K VARLEY</td>
</tr>
<tr>
<td>2.</td>
<td>SPESS introduction – D DELATTRE</td>
</tr>
<tr>
<td>3.</td>
<td>Transport overlay on SPESS – J STEWART</td>
</tr>
<tr>
<td>4.</td>
<td>Orange Book training – F KIRCHNAWY</td>
</tr>
</tbody>
</table>

#### Output Required
- Approved agenda
- Approved Report
- Action record sheet

### 3.0 TRANSSC WORK NOW AND IN THE FUTURE

**Wednesday 9:00-10:30**

#### Purpose
- To provide feedback to TRANSSC Members
- To allow TRANSSC Members to provide input to the programme for the next three years

#### 3.1. Outline of work plans

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1.</td>
<td>Transport Unit Planes 2011-2013 – J STEWART</td>
</tr>
<tr>
<td>2.</td>
<td>Three year report forward look – B BRACH</td>
</tr>
<tr>
<td>3.</td>
<td>CSS forward look – D DELATTRE</td>
</tr>
<tr>
<td>4.</td>
<td>Open discussion</td>
</tr>
</tbody>
</table>

#### Output Required
- Outline work plan for three years

### 4.0 THE DEVELOPMENT OF DOCUMENTS/PRODUCTS

**4.1.1 Wednesday 11:00 – Thursday 11:30**

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<table>
<thead>
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<tbody>
<tr>
<td>1.</td>
<td>Transport Standards update and approval as required</td>
</tr>
<tr>
<td>2.</td>
<td>Update on TS-G-1.1 J STEWART</td>
</tr>
<tr>
<td>3.</td>
<td>Update on TS-G-1.2 K VARLEY</td>
</tr>
<tr>
<td>4.</td>
<td>Update on TS-G-1.3 K VARLEY</td>
</tr>
<tr>
<td>5.</td>
<td>Update on TS-G-1.4 J STEWART</td>
</tr>
<tr>
<td>6.</td>
<td>Update on TS-G-1.6 Y ZHAO</td>
</tr>
<tr>
<td>7.</td>
<td>Update on e-schedules Y ZHAO</td>
</tr>
<tr>
<td>8.</td>
<td>Update on SAT – K VARLEY</td>
</tr>
<tr>
<td>9.</td>
<td>Technical Basis of Regulations Y ZHAO</td>
</tr>
</tbody>
</table>

#### Purpose
- To inform TRANSSC about the status of safety standards
- To comment on and decide on whether to approve documents sent to TRANSSC
- To inform TRANSSC about the status of other relevant requirements

#### 4.2. DPP Approval

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1.</td>
<td>DS 437 TS-R-1 for approval to send to CSS</td>
</tr>
<tr>
<td>2.</td>
<td>DS 453</td>
</tr>
<tr>
<td>3.</td>
<td>DS 455</td>
</tr>
<tr>
<td>4.3.</td>
<td>Draft approval</td>
</tr>
<tr>
<td>4.5.</td>
<td>Information from other UN/International bodies on their documents</td>
</tr>
</tbody>
</table>

Output Required
- An approved version of DS437
- Decision on DPP for DS 453
- Decision on DPP for DS 455

GSR part II and GSR part VII to be added

| 5.0 | THE DEVELOPMENT OF IAEA SECURITY DOCUMENTS |
| Friday 9:30-9:45 |

Purpose
- To inform TRANSSC about the status of security standards

5.1. Nuclear Security Update

Output Required
- None – For information only

| 6.0 | DENIAL OF SHIPMENTS |
| Friday 9:00-9:30 |

Purpose
- To inform TRANSSC on the work of the steering committee on delay and denial
- To provide TRANSSC input to the work of the International Steering Committee on Denial (ISC)

6.1. Update on Denial and Delay

Output Required
- A list of any information for the ISC

| 7.0 | TRANSPORT CONFERENCE |
| Friday 9:45-10:15 |

Purpose
- To inform TRANSSC on the upcoming transport conference

7.1. Transport Conference

Output Required
- None

| 8.0 | OTHER BUSINESS |
| Friday 10:15-11:00 |

Purpose
- To inform TRANSSC on other issues

8.1. TRANSSC/WASSC interface

8.2. Other Items

Output Required
- None

| 9.0 | AGENDA FOR NEXT TRANSSC |
| Friday 11:45-12:00 |

Purpose
- To identify items for the next TRANSSC meeting

9.1. Items of interest for TRANSSC

Output Required
- A list of items to be considered for the next TRANSSC agenda
A. The dates of the meeting are 14 June – 17 June 2011

B. Plenary will convene in Board Room A.

C. The working times for the meeting will be:
   • 9:30 to 1800 on Tuesday,
   • 0900 to 1700 on Wednesday,
   • 0900 to 1730 on Thursday
   • 0900 to 1300 on Friday, we are required to leave the room by 1300

D. Breaks will be taken mid-morning and mid-afternoon each day.

E. Lunch will be 1 and a half hours each day at the discretion of the Meeting Chair.

F. A special dinner event for participants and accompanying persons will be arranged Wednesday evening – everybody pays for their own meal.

G. The following side rooms have been reserved for use of the meeting:

H. You are kindly requested to be at Checkpoint 1 of the Vienna International Centre (VIC) at least one hour before the meeting starts to allow adequate time for our Pass Office to issue your photo badge. The Pass Office opens at 08:00. PLEASE NOTE THAT THE ENTRANCE HAS BEEN ALTERED – THE NEW GATE IS OPEN.
## TRANSSC 22 ACTION RECORD SHEET

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>RECOMMENDATIONS/ACTIONS</th>
<th>DUE</th>
<th>RESPONSIBILITY</th>
<th>STATUS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.7</td>
<td>RECOMMENDATION</td>
<td>As required.</td>
<td>Secretariat</td>
<td>Training courses starting 2011</td>
<td>Delayed</td>
</tr>
<tr>
<td></td>
<td>The Secretariat should promote the use of such a code [INTERTRAN] but may not have a role in the development of a risk assessment code.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.6</td>
<td>Database Decision</td>
<td>TRANSSC 20</td>
<td>TRANSSC Members/Secretariat</td>
<td>On-going – see 20.3</td>
<td>Some funding available – new quotes being obtained</td>
</tr>
<tr>
<td>19.2</td>
<td>RECOMMENDATION</td>
<td>The Secretariat</td>
<td>On-going. Potential for meeting in 2012</td>
<td></td>
<td>See TRANSSC 21</td>
</tr>
<tr>
<td></td>
<td>To investigate organizing a workshop for member states to share information and experiences related to recorded incidents/events, and lessons learnt from such experiences.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>19.13</td>
<td>ACTION</td>
<td>TRANSSC members</td>
<td>No information – feedback requested</td>
<td></td>
<td>Information requested at TRANSSC 20 – no feedback</td>
</tr>
<tr>
<td>NUMBER</td>
<td>RECOMMENDATIONS/ACTIONS</td>
<td>DUE</td>
<td>RESPONSIBILITY</td>
<td>STATUS</td>
<td>NOTES</td>
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</tr>
<tr>
<td></td>
<td>To inform Board representatives of the importance of a TSA for transport</td>
<td></td>
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</tbody>
</table>
| 20.4   | **ACTION**  

discuss UNOB revisions, in particular the need for a new UN number for small quantities of UF6 with UNECE.                                                                                                     | as soon as possible | The Secretariat | Complete |        |
Annex 5

Conclusions regarding Comments on Draft 2.4 of TS-R-1 20XX Edition and Resolutions on 120 D Comments

- Purely editorial: 22
- Table 2 footnote (h): 5
- IATA proposal: 9;
- Transitional arrangement: 11
- Fissile: 18
<table>
<thead>
<tr>
<th>Comment No.</th>
<th>120-day Comment No.</th>
<th>Para No.</th>
<th>Proposed texts</th>
<th>Reasons of objection</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDN/D24/01</td>
<td>General</td>
<td>T22: Relevant CS meeting reports were uploaded to web site.</td>
<td>The review of the revised version of TS-R-1 (ver. 2.4) has proven to be very difficult as the disposition table provided (name of the file to be inserted here) was not complete since it did not include the final disposition of all of the member state comments. In addition the header of the last column (Recommendation) did not include a full list of the various CS and other meeting where the comments were discussed which made it difficult to follow.</td>
<td></td>
</tr>
<tr>
<td>CDN/D24/02</td>
<td>General</td>
<td>T22: Relevant CS meeting reports were uploaded to web site.</td>
<td>The disposition of the Member state comments should be revised to include a proper rationale for the rejection with perhaps extract from the meeting report as it is not always clear as to why a comment was rejected and later re-inserted by another CS and finally rejected again.</td>
<td></td>
</tr>
<tr>
<td>CDN/D24/03</td>
<td>General</td>
<td>T22: revision of TS-G-1.1 is in progress. The draft is available.</td>
<td>Since the revised copy of TS-G-1.1 has not been included, it is difficult to see if all instances where comments are to be addressed in TS-G-1.1 are adequately covered and this may have an impact on the acceptability of some of the proposed text in TS-R-1.</td>
<td></td>
</tr>
<tr>
<td>IAEA/D24/01</td>
<td>General</td>
<td>T22: accepted</td>
<td>Any issues raised by Fukushima accident that may require revision at a future date should be noted. This should not delay the approval and publication process as changes can be included</td>
<td></td>
</tr>
</tbody>
</table>

TRANSSC 22 conclusions
at a later date. However, it is important to be aware of these and to be able to deal with any comments raised by MS.

<table>
<thead>
<tr>
<th>Reference</th>
<th>General</th>
<th>Action</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAEA/D24/02</td>
<td>General</td>
<td>T22: the draft of Annex IV is ready for discussion</td>
<td>Note 2 on the front cover states that there is one more Annex that is not attached. ANNEX IV – Guiding principles underlying the IAEA Transport Regulations which is related to the BSS. As it appears to be a new Annex to TS-R-1, it would be appreciated if a copy of this Annex could be provided.</td>
</tr>
<tr>
<td>E/D24/15</td>
<td>CS-32</td>
<td>107 (d)</td>
<td>T22: keep existing text in the draft 2.4and TS-G-1.1takes consideration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The ICAO has recently introduced a similar provision for the in the 2011-2012 Edition of the Technical Instructions (Part 1, Chapter 6, page 1-6-1, paragraph 6.1.4, add new sub-paragraph b): b) a person who has been subject to accidental or deliberate intake of or contamination from radioactive material and is to be transported for medical treatment, taking into account the necessary radiological protection measures with respect to other passengers and crew, subject to approval by the operator; It is considered necessary to try to harmonize as much as possible both provisions.</td>
</tr>
<tr>
<td>AUS/D24/01</td>
<td>RCM NORM, TRANSSC 21</td>
<td>107 (f)</td>
<td>T22: Rejected this proposal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This section now effectively means “All materials containing naturally occurring radionuclides” - Everything is either “natural material” or “natural material that has been processed”. Applying the factor of 10 increase...</td>
</tr>
</tbody>
</table>
in exemption concentration to virtually all material containing natural radionuclides results in materials with quite high external dose rates being exempted.

**Australia recommends that the version in the 2009 Edition be maintained.**

<table>
<thead>
<tr>
<th>Country</th>
<th>Code</th>
<th>Item</th>
<th>Paragraph</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUS/D24/02</td>
<td>CS-29</td>
<td>107 (f) bis</td>
<td>T22: need guidance material in TS-G1.1</td>
<td>What degree of departure from strict equilibrium is allowable before the para 405 requirements must be made? Unprocessed ores are not always in equilibrium, and even a small amount of processing can further upset equilibrium. This further confuses the exemption but no change would be necessary if the version in the 2009 Edition is maintained. <strong>Australia recommends that the version in the 2009 Edition be maintained.</strong></td>
</tr>
<tr>
<td>CDN/D24/04</td>
<td>RCM NORM, TRANSSC 21</td>
<td>107(f)</td>
<td>T22: Rejected this proposal</td>
<td>The propose change will create an inconsistency between the exemption quantities found in the BSS and those found in TS-R-1 as there is now a blanket exemption for NORM material up to 10 times the exemption quantity found in Table 2. If the reasoning for this change is based on the fact that the exemption values are too low, it would be more reasonable to change those values rather than keeping those values and then exempting them in para 107. Canada supports the comment from France F/120D/02.</td>
</tr>
<tr>
<td>IAEA/D24/04</td>
<td>New</td>
<td>108</td>
<td></td>
<td>These regulations do not specify controls such as include routing or</td>
</tr>
</tbody>
</table>
physical protection that may be instituted measures for reasons nuclear or other than radiological safety. Any such controls shall take into account radiological radioactive material while in transport. Physical protection measures for nuclear and non-radiological hazards other radioactive material in transport is specified in IAEA Nuclear Security Series No. 13 “Recommendations for Physical Protection of Nuclear Material and shall not detract from the standards of safety that these Regulations are intended to provide. Nuclear Facilities (INFCIRC/225/Rev.5)” and IAEA Nuclear Security Series No. 14 “Recommendations on Security of Radioactive Material and Associated Facilities.

| IND/D24/06 | new | 108 | Para 108. These regulations do not include specify controls such as routeing or physical protection measures for nuclear or other radioactive matee rial while in transport; which may be instituted for reasons other than radiological safety. Physical protection measures for nuclear and other radioactive material in transport is are |
| --- | --- | --- | Reasons: 1) If we use ‘include’ instead of ‘specify controls such as’, proposed para 108 will be contradictory to para 109. The Regulations mention about the security, physical protection etc.; but, do not elaborately specify necessary measures. The last sentence of the original para is very important. We cannot afford to lose it. |
specified in IAEA Nuclear Security Series No.13 “Recommendations for Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Rev.5)” and IAEA Nuclear Security Series No. 14 “Recommendations on Security of Radioactive Material and Associated Facilities”. Any such controls shall take into account radiological and non-radiological hazards and shall not detract from the standards of safety which these Regulations are intended to provide.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Line</th>
<th>T22:keep para.108 as it is in draft 2.4</th>
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</thead>
<tbody>
<tr>
<td>IAEA/D24/06</td>
<td>108</td>
<td>Reference</td>
</tr>
<tr>
<td>IAEA/D24/05</td>
<td>108,</td>
<td>Reference [1-2]</td>
</tr>
<tr>
<td>UA/D24/01</td>
<td>New</td>
<td>2xx DEFINITION</td>
</tr>
</tbody>
</table>

Also insert a reference to the recommendations document on RAM, this should read: INTERNATIONAL ATOMIC ENERGY AGENCY, Recommendations on the Security of Radioactive Material and Associated facilities, IAEA Nuclear Security Series No.14, IAEA, Vienna 2011.


In reactor core calculations, simulation or critical and subcritical assemblies, and various
<table>
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<tr>
<th>Page</th>
<th>Notes</th>
<th>Text 1</th>
<th>Text 2</th>
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</thead>
</table>
|      | NS    | following definition: “subcritical system is a system that contains fissile materials and whose neutron multiplication factor remains lower than 0.95 with conservative credit of process tolerances and calculation errors under optimal neutron moderation conditions”  
T22: it’s a new . not considered | critical experiments, a subcritical system is one whose effective neutron multiplication factor is lower than 1. In nuclear safety assessments of fissile material transport systems, all countries (including USA, Great Britain, France, Germany, Russia, Ukraine, etc.) consider that a surely subcritical system is one whose calculated neutron multiplication factor remains lower than 0.95 with conservative credit of process tolerances and calculation errors under optimal neutron moderation conditions |
| D/D24/01 | New see USA/D24/14 | 220 | T22: accepted this proposal |
|      | Consistency: to be consistent with para. 802 (a) include „fissile material excepted under para. 417 (f)” as follows:  
220. Design shall mean the description of fissile material excepted under para. 417 (f), special form radioactive material, low dispersible radioactive material, package or packaging that enables such an item to be fully identified. The description may include specifications, engineering drawings, reports demonstrating compliance with regulatory requirements, and other relevant documentation. |
| CDN/D24/05 | CS-19 T20 TM-38941, GER/0910 UK/07/08 | 221 | Delete “where so required by these regulations”  
T22: reject this proposal |
|      | Clarification required or deletion of The words "where so required" should be deleted. Section II is definitions and definitions should not create a requirement. The wording that is proposed in Draft 2.4 creates a requirement and is inconsistent with the IAEA style used for definitions. |
| CDN/D24/06 | 222 | T22: TS-G-1.1 will consider this comments
Add “more than 0.25 g of” between “with” and “fissile nuclides” in the last new sentence.
The revised sentence is “These exclusions are only valid if there is no other material with more than 0.25 g of fissile nuclides in the package.”
T22: TS-G-1.1 considers the depleted uranium as shielding
It is still not clear if the revised wording allows the use of depleted uranium as shielding material for packages transporting fissile nuclides due to the last sentence of this paragraph: “These exclusions are only valid if there is no other material with fissile nuclides in the package.” In the disposition table, it is stated that guidance will be developed but it has not been provided.
If a material with fissile nuclides is not “fissile material”, then it should be allowed in a package with the excluded material. This avoids nullifying the exclusion for minute quantities of fissile nuclides somewhere else in the package or shipment.
| F/D24/2 | CS-05 | 222 | T22: TS-G-1.1 need guidance for France comments
The modifications are acceptable but it should be added in TS-G-1.1 confirmation that 0.25 g
| USA/d24/1 | CS-05 | 222 | Fissile nuclides shall mean uranium-233, uranium-235, plutonium-239 and plutonium-241. Fissile material shall mean a material containing any of the fissile nuclides. in quantities exceeding a total of 0.25g per package or per consignment if shipped unpackaged. Excluded from the definition of fissile material is any combination of 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.
These exclusions are only valid if there is no other material with fissile nuclides in the package or in the consignment if shipped unpackaged. | The last sentence of the current para limits contents to only one material (or material type?). However, since the limit of 0.25 g is not an exclusion, the current text could be interpreted to allow multiple materials with <0.25 g per “material” to be loaded in a package and all would be exempt from requirements on controls for fissile material. Thus, a shipper could load a package with numerous discrete pellets having <0.25 g / pellet and claim each pellet as a separate material that does not meet fissile material definition. The proposed new text more clearly identifies the intent that only one material with <0.25 g is allowed per package OR the shipper has to identify the entire contents as one fissile material with <0.25 g. |
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</thead>
<tbody>
<tr>
<td>F/D24/3</td>
<td>CS-29</td>
<td>223</td>
<td>T22: have discussed with UNECE about definition during the CS-29 in Feb. 2011.</td>
</tr>
<tr>
<td>IAEA/D24/07</td>
<td></td>
<td>223</td>
<td>... The term &quot;freight container&quot; does not include the vehicle.</td>
</tr>
</tbody>
</table>
| CDN/D24/07 | WNTI/120D/04 | 233 | Add “equivalent” between “corresponding” and “dose”
   “233. *Radiation level* shall mean the corresponding equivalent dose rate “
   T22: use both units mSv/h umSv/h | Clarification to differentiate that we mean some SI multiple of Sv/h (mSv/h, uSv/h etc.) rather than something in a SI multiple of Gy/h.
   Alternately revert to original and use units consistently throughout document. i.e. convert uSv/h to mSv/h. |
| F/D24/4 | WNTI/120D/04 | 233 | 233. *Radiation level* shall mean the corresponding radiation equivalent dose rate
   T22: use both units mSv/h umSv/h | If the unit of the radiation level is deleted the text should be more precise to distinguish between dose rate and equivalent dose rate.
   Remark: in the next review cycle, the wording “radiation level” which is used only in the transport regulation could be changed for harmonization purpose with other nuclear activities (see IAEA glossary). |
| IND/D24/01 | WNTI/120D/04 | 233 | T22: use both units mSv/h umSv/h | Removing the unit of dose rate in the definition may interpret radiation level different from the intended one. The dose rate here means the equivalent dose rate related with radiation protection. Without the specified unit the dose rate may mean in microGray per hour or milliGray per hour. To avoid this confusion, the unit may still be retained which may be in “**millisieverts per hour or microsieverts per hour, as appropriate**”. |
| AUS/D24/03 | CS-32 IAEA Glossary | 247 and Table 2, footnote (b) | T22: to be addressed late when the value in table 2 are recalculated. | The nomenclature throughout the document needs to be consistent. Natural uranium is defined in paragraph 247 as “uranium (which may be chemically separated) containing the naturally occurring distribution of uranium isotopes (approximately 99.28% uranium-238... |
and 0.72% uranium-235, by mass).”

Table 2 on the other hand uses “U (natural)” in the table itself and “U-natural” in the footnote. The use of the term “U (natural)” or “U-natural” to mean uranium and all its decay products is however inconsistent and confusing. All logic would point to “U (natural)” being equivalent to “natural uranium” but this is not so. Footnote (b) shows that it is used to mean “uranium in equilibrium with all its decay products”. Radiologically, this is an entirely different material. It is an obvious potential source of confusion to have such a counter-intuitive and inconsistent terminology, and a terminology such as U (equilibrium) is suggested.

Also, footnote (b) to Table 2 is inconsistent on both U (natural) and Th (natural) – nowhere does it say that U-238 or Th-232 are included in the respective decay series.

“U (equilibrium)” is suggested as a possible replacement for “U (natural)”.

Australia recommends that reference to natural uranium be made consistent throughout the document, including nomenclature.

During the 120 days comment period there was
a comment from South Africa (ZA/120D/7) on this paragraph which has not been taken into account. Also, it is not clear from the disposition table if the comment was accepted or rejected since there is no disposition for this comment.

| 8 | 247 | 247. *Natural uranium* shall mean uranium (which may be chemically separated) containing the naturally occurring distribution of uranium isotopes (approximately 99.28% uranium-238 and 0.72% uranium-235, by mass). *Depleted uranium* shall mean uranium containing a lesser mass percentage of uranium-235 than natural uranium. *Enriched uranium* shall mean uranium containing a greater mass percentage of uranium-235 than 0.72%. In all cases, a very small mass percentage of uranium-234 is present. |
| F/D24/5 | USA/120D/04, CS143, CS-19, CS 167 fissile excepted | 307 | Add “for the purpose(s) that it has been designated or recognized” at the end of the sentence. |
| CDN/D24/09 | USA/120D/04, CS143, CS-19, CS 167 fissile excepted | 307 | “307. The *competent authority* shall assure compliance with these Regulations for the purpose(s) that it has been designated or recognized. T22: see IND/D24/02 |
| D/D24/02 | USA/120D/04, CS143, CS-19, CS 167 fissile excepted | 307 | 307. The *competent authority* shall |

Editorial only.

The US proposal to delete the second sentence
<table>
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<th>Date</th>
<th>Reference</th>
<th>Page</th>
<th>Summary</th>
<th>Notes</th>
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<tr>
<td>CS143 CS-19 CS 167 fissile excepted</td>
<td>assure compliance with these Regulations. If applicable, means to discharge this responsibility include the establishment and execution of a programme for monitoring the design, manufacture, testing, inspection and maintenance of packaging, special form radioactive material and low dispersible radioactive material, and the preparation, documentation, handling and stowage of packages by consignors and carriers, to provide evidence that the provisions of these Regulations are being met in practice.</td>
<td>CS143 completely has been accepted by CS-143. This second sentence which is there for many years provides important information although this list of activities may be not complete and not always applicable as it was criticized by the U.S. It is therefore proposed to maintain the second sentence but to start this sentence with the addition “If applicable”. This approach would be also consistent with the changes to paras 501 and 503 (which have been agreed by TRANSSC already) where also new text has been combined with old one to make sure that important information will not be lost on a regulatory level.</td>
<td></td>
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</tr>
<tr>
<td>IND/D24/02 USA/120D/04, CS143 CS-19 CS 167 fissile excepted</td>
<td>307</td>
<td>T22: first sentence remained as it is and second deleted</td>
<td>There is no harm in retaining the sentences proposed to be deleted. The sentences obviously infer that the list is not exhaustive. If the deletion is to be accepted, then para 307 will be of one sentence for sake of retaining it. Para 208 gives better and more appropriate sentence.</td>
<td></td>
</tr>
<tr>
<td>B/D24/01 B/120D/01</td>
<td>309</td>
<td>T22: editorial change was made.</td>
<td>A virgule missing between consignor and consignee: 309. In the event of non-compliance with any limit in these Regulations applicable to radiation level or contamination: (a) The consignor, consignee, carrier and any organization involved during transport who may be affected, as appropriate, shall be informed of the non-compliance by:</td>
<td></td>
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<tr>
<td>Reference</td>
<td>Paragraph</td>
<td>Text</td>
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<tr>
<td>F/D24/6</td>
<td>309</td>
<td>In the event of non-compliance with any limit in these Regulations applicable to radiation level or contamination: (a) The consignor, consignee, carrier and any organisation involved during transport, who may be affected, as appropriate, shall be informed of the non-compliance by:… T22: editorial change was made. Editorial. Edit text in draft 2.4 to be consistent with the text in the table of change (missing comma is in red).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IND/D24/03</td>
<td>B/120 D/01</td>
<td>309</td>
<td>T22: keep the text exist in draft 2.4 The recommendation of TRANSSC 21 is more appropriate. Deletion of the words “who may be affected” should not be done. In fact regulatory authority will come to know much later about the non-compliance and be difficult to trace who were the people got exposed to radiation unless those people come forward and report. Many affected people (public) will not do this due to ignorance. However, it will be very easy for the consignor, consignee or carrier, as appropriate, to identify and report to the competent authority of the affected people.</td>
<td></td>
</tr>
<tr>
<td>CDN/D24/10</td>
<td></td>
<td>401</td>
<td>References should be changed to paras 408-434 T22: editorial change was made. Editorial</td>
<td></td>
</tr>
<tr>
<td>D/D24/03</td>
<td></td>
<td>401</td>
<td>T22: editorial change was made. Editorial: correct reference is 408-434. 401. Radioactive material shall be assigned to one of the UN numbers specified in Table 1 in accordance with paras 408–435 434.</td>
<td></td>
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<td>Code</td>
<td>Page</td>
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<td>Action</td>
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<tr>
<td>USA/d24/2</td>
<td>401</td>
<td></td>
<td><em>Radioactive material</em> shall be assigned to one of the UN numbers specified in Table 1 in accordance with paras 408–433.</td>
<td>To be consistent with para renumbering.</td>
</tr>
<tr>
<td>CDN/D24/11</td>
<td>403</td>
<td></td>
<td>Add “,” after “radionuclides” in the new text.</td>
<td>Editorial</td>
</tr>
<tr>
<td>CDN/D24/13</td>
<td>404</td>
<td></td>
<td>“For these radionuclides, activity concentrations for exempt material and activity limits for exempt <em>consignments</em> shall be calculated in accordance with the principles established in Ref.[2].”</td>
<td>Verify that the use of these words is appropriate in the paragraph and footnote (a) of Table 2 as both are used and provide a justification for the change.</td>
</tr>
<tr>
<td>F/D24/7</td>
<td>404</td>
<td></td>
<td>… and in which no daughter nuclide has a half-life…</td>
<td>Text improvement.</td>
</tr>
<tr>
<td>F/D24/9</td>
<td>409</td>
<td></td>
<td>…(a) <em>LSA-I:</em> Either:</td>
<td>Editorial. In the DS437 draft 2.4 some words are needed as follow:</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>(i) <em>Uranium</em> and thorium ores and concentrates of such ores, and other ores containing naturally occurring radionuclides; <em>Natural uranium, depleted uranium,</em> natural thorium or their</td>
<td></td>
</tr>
</tbody>
</table>
(iii) Radioactive material for which the $A_2$ value is unlimited. Fissile material may be included only if excepted under para. 417; or

(iv) Other radioactive material in which the activity is distributed throughout and the estimated average specific activity does not exceed 30 times the values for activity concentration specified in paras 402–407. Fissile material may be included only if excepted under para. 417.

(b) LSA-II:

Either:

(i) Water with a tritium concentration of up to 0.8 TBq/L; or

(ii) Other material in which the activity is distributed throughout and the estimated average specific activity does not exceed $10^5 A_2$/$g$ for solids and gases, and $10^6 A_2$/$g$ for liquids.

T22: rejected this proposal

<p>| CDN/D24/14 | 413 | 4 x $10^7$ or 10000? T22: editorial change was made. | Consistency throughout the document |</p>
<table>
<thead>
<tr>
<th>F/D24/10</th>
<th>CS-05 11Feb11</th>
<th>417</th>
<th>417. <em>Fissile materials</em> and… …(ii) The total plutonium and uranium-233 content does not exceed 1% of the mass of uranium-235 per package; …. T22: accepted this proposal</th>
<th>1/ Editorial, first line.” 2/ The sub-para. 417(c)(ii) should be completed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH/D24/01</td>
<td>USA/120D/06</td>
<td>417 (d)</td>
<td>T22: editorial change was made.</td>
<td>Clearly accepted by CS-05, see meeting report Rev. 3 (pages 11/522 and 21/522): 2.0 g should be used instead of 0.5 g</td>
</tr>
<tr>
<td>D/D24/04</td>
<td>CS-05 11Feb11</td>
<td>417 (f)</td>
<td>T22: maintain as it is in draft 2.4</td>
<td>Clarification: Specify reference to 802 (a) (iii) at the end.  (f) A fissile material that meets the requirements of paras 570 (b), 606 and 802 (a) (iii).</td>
</tr>
<tr>
<td>USA/d24/4</td>
<td>CS-05</td>
<td>417 (f)</td>
<td>A <em>fissile material</em> that meets the requirements of paras 570 (b), 606 and 802 805.</td>
<td>To be consistent with para renumbering. <em>(Para 802 is not renumbered.)</em></td>
</tr>
<tr>
<td>E/D24/02</td>
<td>General Avoid the cross references CS-05 11Feb11</td>
<td>417 c), d), e), 570</td>
<td>T22: rejected this proposal.</td>
<td>In order to simplify and clarify the Regulations it is possible to avoid the cross references made in para. 417 c), d) and e) to para.570 c), d) and e), in relation with the consignments limits, whether these limits are directly included in 417c), d) and e) and the 570 c), d) and e) are deleted.  Moreover, according to Table of resolution of comments, for the comments E/120D/12;</td>
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<td>Code</td>
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<td>Remarks</td>
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<tr>
<td>CDN/D24/15</td>
<td><strong>CS-05 120day.</strong> 418</td>
<td><strong>T22:</strong> the text in 120-day comment conclusion was changed by CS-32</td>
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<tr>
<td></td>
<td></td>
<td><strong>Reference to para 816 should be changed to 834</strong></td>
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<td><strong>T22:: removed the reference numbers</strong></td>
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<td><strong>The revised paragraph does not appear to reflect the comments made during the 120-days comment period.</strong></td>
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<td>Para 816 only specifies that an approval is required while para 834 provides the details on the content of this approval which appears to be more appropriate.</td>
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<tr>
<td>D/D24/05</td>
<td>418</td>
<td><strong>418. The contents of packages containing fissile material shall be as specified for the package design either directly in these Regulations or in the certificate of approval, in accordance with the applicable paras 417(a)-(f), 674, 675 and 806 or 816.</strong></td>
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<td><strong>T22:: removed the reference numbers</strong></td>
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<td>a) Clarification: this para applies also to the new category of approved material according to para. 806. It must be referenced also.</td>
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<td>b) Editorial: change content into contents.</td>
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<tr>
<td>E/D24/03</td>
<td><strong>CS-05 J/120D/06</strong> 418</td>
<td><strong>T22:: removed the reference numbers</strong></td>
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<td></td>
<td></td>
<td><strong>The drafting of this paragraph in the Table of changes doesn’t coincide with the resolution of comment J/120D/06, which was accepted by CS-143, as modified.</strong></td>
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<td><strong>The Japanese proposal modified according to</strong></td>
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<td>Ref</td>
<td>Date</td>
<td>Title</td>
<td>Page</td>
<td>Notes</td>
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<tr>
<td>IND/D24/04</td>
<td>J/120D/06</td>
<td></td>
<td>418</td>
<td>CS-143 is clearer and doesn’t use cross references, which complicates the use of Regulations. Suggested to delete the word “allowed” instead of “authorized” in order to maintain consistency with para 431, 432, 433 and 434. Moreover, use of ‘authorized’ is legalistic. 87</td>
</tr>
<tr>
<td>USA/d24/5</td>
<td>CS-05</td>
<td></td>
<td>418</td>
<td>The content of packages containing fissile material shall be as specified for the package design either directly in these Regulations or in the certificate of approval, in accordance with the applicable paras 417(a)-(f), 674, 675 or 816. <strong>417 and 673-675</strong> T22: removed the reference numbers Correctness</td>
</tr>
<tr>
<td>D/D24/06</td>
<td>CS-143, Nov10 USA/120D/08 TM-38941, Jan10</td>
<td></td>
<td>419</td>
<td>Uranium hexafluoride shall be assigned to one of the following UN numbers only: (a) UN 2977, RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, FISSILE; (b) UN 2978, RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, non-fissile or fissile-excepted; (c) UN 3XXX RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - URANIUM HEXAFLUORIDE, less than 0.1 kg per package, in the case of uranium hexafluoride in quantities of less than 0.1 kg in an excepted package. Editorial: list only the proper shipping name, repetition is not necessary.</td>
</tr>
</tbody>
</table>
**T22: accepted a**

| E/D24/04 | USA/120D/08 | 419 | **419 (c) UN 3XXX RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - URANIUM HEXAFLUORIDE, less than 0.1 kg per package**  
T22: see D/D24/06 | The last sentence in para. 419 c) is not necessary, since it is repetitive respect to the proper shipping name of the UN number. The item c) should be coherent with a) and b) where only the UN proper shipping name is used: |
|----------|-------------|-----|---------------------------------------------------------------------------------------------------------------|
| USA/d24/6 | CS-143, Nov10  
USA/120D/08  
TM-38941, Jan10 | 419 (c) | **UN 3XXX RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - URANIUM HEXAFLUORIDE, less than 0.1 kg per package, non-fissile or fissile-excepted. In the case of uranium hexafluoride in quantities of less than 0.1 kg in an excepted package.**  
T22: accepted as that in draft 2.42.  
419(c), 422 | To correct editing error. |
| IAEA/D24/09 | CS-32  
TRANSSC 21, TSU  
CS-143,  
WNTI/120D/10  
TM-38941, Jan10 | 422 | **422. Packages may only be classified as excepted packages if the condition of para. 515 is met** and if:  
(a) They are empty packages having contained radioactive material.;  
(b) They contain instruments or articles in limited quantities as specified in Table 5;  
(c) They contain articles manufactured of natural uranium, depleted uranium or natural thorium;  
(d) They contain radioactive | This para is not requirement but just lists the possible materials that may be classified as excepted package. The requirements or conditions are described in the following paras. (Paras.423, 424, 425, 426, 427). For materials transported by IPs, Type A or Type B packages, there is no such list. For consistency with other packages this para or just simplify it as suggested in the resolution of 120-day comments. |
material in limited quantities as specified in Table 5; or  
(e) They are designed to contain less than 0.1 kg of uranium hexafluoride not exceeding the activity limits specified in column 4 of Table 4.  
T22: see the text in draft 2.42

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<th>Remarks</th>
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<tbody>
<tr>
<td>E/D24/05</td>
<td>E/120D/07, CS-143 T20, Jun10 CS-19, Feb10</td>
<td>423</td>
<td>T22: changes was made by CS-32.</td>
</tr>
<tr>
<td>D/D24/07</td>
<td>E/120D/07</td>
<td>423 (b)</td>
<td>T22: rejected this proposal</td>
</tr>
</tbody>
</table>

The drafting of this paragraph in the Table of changes doesn’t coincide with the resolution of the comment E/120D/07, which was accepted by CS-143, as modified.

It is not necessary to include ‘do not require markings’ in points i), ii) and iii), since the exception of marking is clearly stated on the heading sentence of b)

| (b) Each instrument or article bears the marking “RADIOACTIVE” on its external surface except for the following: |
| (i) Radioluminescent time-pieces or devices do not require markings. |
| (ii) Consumer products that have either received regulatory approval in accordance with para. 107(e) or do not individually exceed the activity limit for an exempt consignment in Table 2 (column 5) do not require markings, provided that such products are transported in a package that bears the marking “RADIOACTIVE” on its internal surface in
<table>
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<tr>
<th>Code</th>
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<th>Text</th>
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</thead>
<tbody>
<tr>
<td>USA/d24/7</td>
<td>CS-32</td>
<td>423(e)</td>
<td>For transport by post, the total activity in each <em>excepted package</em> shall not exceed one tenth of the relevant limits specified in column 3 of Table 4. <em>(e)</em> For transport by post, the total activity in each <em>excepted package</em> shall not exceed one tenth of the relevant limits specified in column 3 of Table 4. T22: accepted this proposal</td>
</tr>
<tr>
<td>CDN/D24/16</td>
<td>(b)</td>
<td>423(b)</td>
<td><em>(b)</em> Each instrument or article bears, <em>where practical</em>, the marking “RADIOACTIVE” where marking the instrument or article is not practical then the packaging shall bear the marking “RADIOACTIVE” on an internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package. Excepted from any such marking are: <em>(i)</em> Radioluminescent time pieces or</td>
</tr>
</tbody>
</table>
devices.
(ii) Consumer products that have either received regulatory approval according to para. 107(d) provided that such products are transported in a package that bears the marking “RADIOACTIVE” on an internal surface in such a manner that warning of the presence of radioactive material is visible on opening the package.
(iii) Consumer products that do not individually exceed the activity limit for an exempt consignment in Table 2 (column 5).

(iii) Other instruments.....

T22:

<table>
<thead>
<tr>
<th>USA/d24/8</th>
<th>CS-32</th>
<th>424</th>
<th>For transport by post, the total activity in each excepted package shall not exceed one tenth of the relevant limits specified in column 4 of Table 4. (c) For transport by post, the total activity in each excepted package shall not exceed one tenth of the relevant limits specified in column 4 of Table 4. T22: accepted this proposal</th>
<th>No reference to why this format change was necessary and approved</th>
</tr>
</thead>
</table>
| D/D24/08 | J/120D/07 | 425 | T22: accepted this proposal                                                      | Clarification:
                                                                                     Uranium hexafluoride not exceeding the limits specified in column 4 of Table 4 may be |
classified under UN 3XXX RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - URANIUM HEXAFLUORIDE, less than 0.1 kg per package, provided that:
(a) The mass of uranium hexafluoride in the package is less than 0.1 kg.
(b) The conditions of paras 420 and 424 (a), (b) are met.
For transport by post, the mass of uranium hexafluoride in the package shall be less than 10 g.

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<th>Action</th>
<th>Changes</th>
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</thead>
<tbody>
<tr>
<td>E/D24/06</td>
<td>CAN/120D/11</td>
<td>431, 432, 434 (merged)</td>
<td>T22: editorial change was made.</td>
<td>Editorial: Change content into contents: 432. The contents of a Type B(U), Type B (M) or Type C package shall be as specified in the certificate of approval.</td>
</tr>
<tr>
<td>D/D24/09</td>
<td>F/120D/15</td>
<td>432</td>
<td>T22: editorial changes was made</td>
<td>Editorial: change content into contents. 432. The contents of a Type B(U), Type B (M) or Type C package shall be as specified in the certificate of approval.</td>
</tr>
<tr>
<td>CDN/D24/1</td>
<td></td>
<td>433</td>
<td>100 000 or $10^5$. T22: editorial changes was made</td>
<td>Consistency</td>
</tr>
<tr>
<td>D/D24/10</td>
<td></td>
<td>502</td>
<td>502 Before each shipment of any package, it shall be ensured that the package contains neither: (a) Radionuclides different from those assessed specified for the package design; nor</td>
<td>Editorial: replace „assessed“ by „specified“ as more appropriate term.</td>
</tr>
</tbody>
</table>
(b) Contents in a form, or physical or chemical state different from those assessed specified for the *package design*.

T22: accepted as modified in draft 2.42

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<th>Action</th>
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<tbody>
<tr>
<td>CH/ D 24/02</td>
<td>WNTI/120D/14 CS-143</td>
<td>505</td>
<td>T22: rejected this proposal. It is a new issue.</td>
<td>WNTI/120D/14 Should be accepted because clarification is provided for contamination level of conveyances instead of indirect provision by para 214</td>
</tr>
<tr>
<td>D/D24/11</td>
<td>RA/120D/23</td>
<td>505</td>
<td><strong>Freight containers, IBCs, overpacks and tanks</strong>, as well as other <em>packagings and overpacks</em> used for the transport of <em>radioactive material</em> shall not be used for the storage or transport of other goods unless decontaminated below the level of 0.4 Bq/cm² for beta and gamma emitters and <em>low toxicity alpha emitters</em> and 0.04 Bq/cm² for all other alpha emitters.</td>
<td>Clarification: an overpack is not a packaging.</td>
</tr>
<tr>
<td>D/D24/12</td>
<td>B/120D/08; CS-05</td>
<td>515</td>
<td>(a) The requirements specified in paras 503, 504, 505, 507–513, 516, 530-533, 545, 546 introductory sentence, 546 (a), (j) and (k) and (l), 550-553, 555, 556, 561, 564, 582 and 583; T22: accepted deletion of (j). reject adding (l)</td>
<td>Clarification: para 546 (j) doesn’t apply for excepted packages, but 546 (l) does apply.</td>
</tr>
<tr>
<td>D/D24/13</td>
<td></td>
<td>515</td>
<td>(c) If the <em>excepted package</em> contains <em>fissile material</em>, one of the fissile</td>
<td>Clarification: the reference to para 570 should be added.</td>
</tr>
<tr>
<td>Reference</td>
<td>Page</td>
<td>Column 3</td>
<td>Note</td>
<td></td>
</tr>
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<tr>
<td>USA/d24/9</td>
<td>515 (c)</td>
<td>If the <em>excepted package</em> contains <em>fissile material</em>, one of the fissile exceptions provided by para. 417 shall apply; <em>This implies that also para. 636 shall be complied with</em>; T22: see USA/d24/9</td>
<td>Para 417 allows unpackaged to be approved so 636 would then not apply.</td>
<td></td>
</tr>
<tr>
<td>CDN/D24/18</td>
<td>515(c)</td>
<td>If the <em>excepted package</em> contains <em>fissile material</em>, one of the fissile exceptions provided by para. 417 shall apply and the requirement of this implies that also para. 636 shall be met. T22: accepted this proposal as modified in draft 2.42</td>
<td>Consistent with comments made by Member State during the 120-days comment period. In addition, the use of the word “imply” is not appropriate for regulatory text.</td>
<td></td>
</tr>
<tr>
<td>F/D24/11</td>
<td>WNTI/120D/16, CS-143</td>
<td>519</td>
<td>517bis 519. For <em>LSA material</em> and <em>SCO</em> that are or contain <em>fissile material</em>, that is not excepted under para. 417, and for that do not meet the requirements of paras 674 and 675, the applicable requirements of para. 673 shall be met. T22: accepted this proposal</td>
<td>1/ Editorial: delete reference to 517bis. 2/ Fissile exceptions 417, 674 and 675 are already stated in para. 673. To prevent redundancy, change the para. as proposed.</td>
</tr>
<tr>
<td>CDN/D24/19</td>
<td>WNTI/120D/17, CS-143</td>
<td>520 (a)</td>
<td>T22: to make sure the TS-G-1.1 takes this into account.</td>
<td></td>
</tr>
<tr>
<td>CDN/D24/20</td>
<td>E/120D/09, CS-143</td>
<td>520(d)</td>
<td>(d) Unpackaged <em>fissile material</em> shall meet the requirements of paras 417(e) and 570(e)</td>
<td>Has the intent of paragraph 520(a) been clarified in TS-G-1.1 as per the comment from WNTI (WNTI/120D/17)?</td>
</tr>
<tr>
<td>CDN/D24/20</td>
<td>E/120D/09, CS-143</td>
<td>520(d)</td>
<td>Suggest adding reference to para 570(e) as per comments received in the 120-days comment period.</td>
<td></td>
</tr>
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<td>Page</td>
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<td>----------------------------------------------------------------------</td>
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<tr>
<td>E/D24/07</td>
<td>IND/120D/14</td>
<td>529</td>
<td>e) Change ‘which that’ into ‘that’: An overpack or freight container that contains packages transported under special arrangement shall be assigned to</td>
<td>T22: editorial changes was made</td>
</tr>
<tr>
<td>E/D24/16</td>
<td>WNTI/120D/20, CS1 43; CS-19 amended</td>
<td>541</td>
<td>541. Each label conforming to the model in Fig. 5 shall be completed with the CSI as stated in the certificate of approval applicable in the countries through or into which the consignment is transported and issued by the competent authority or as specified in paras 674 or 675.</td>
<td>A provision should be established for the case that different countries of transit define different CSI for the packages. In that case what CSI should be indicated in the label?</td>
</tr>
<tr>
<td>B/D24/03</td>
<td>TM-38941</td>
<td>543</td>
<td>[…] where appropriate, as shown in Figs 2–4 5, except having the minimum size shown in Fig. 6</td>
<td>T22: not included Fig. 5</td>
</tr>
<tr>
<td>E/D24/08</td>
<td>D/120D/32</td>
<td>546</td>
<td>(c) The UN class number “7” in accordance with the UN Model Regulations [10]; T22: retaining class 7, delete UN number</td>
<td>In (c) it is not necessary to refer to the reference UN Model Regulations [10], since similar reference may be used in many other parts of the TS-R-1</td>
</tr>
<tr>
<td>D/D24/14</td>
<td>CS-19</td>
<td>546</td>
<td>(j) For fissile material: (i) Shipped under one exception of</td>
<td>The required information under (i), (ii) and (iii) doesn’t provide any useful information to the</td>
</tr>
<tr>
<td>Document</td>
<td>Section</td>
<td>Description</td>
<td>Action</td>
<td>Notes</td>
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<tr>
<td>CS-167:</td>
<td></td>
<td>sub-paras 417(a)-(f), reference to that para; (ii) Shipped under para. 417(c)–(e), the total mass of fissile nuclides; (iii) Contained in a package for which one of paras 674(a)–(c) or 675 is applied, reference to that para; (iv) The CSI, where applicable.</td>
<td>carrier and complicates the list of information unnecessarily. It’s proposed to delete them and go back to the current wording of TS-R-1 (2009).</td>
<td></td>
</tr>
<tr>
<td>CDN/D24/21</td>
<td>IATA</td>
<td>555</td>
<td>T22: incorporated IATA’s proposal in TS-R-1 as that in draft 2.42 (para. 555 and addition paras at the end of this section)</td>
<td>Suggest moving to TS-G-1.1. since it only provides guidance. This was recommended by TRANSSC 21.</td>
</tr>
<tr>
<td>J/D24/01</td>
<td>IATA</td>
<td>555(552bis)</td>
<td>T22: see CDN/D24/21</td>
<td>It was accepted by TRANSSC 21 that Para 555 was moved to TS-G-1.1. But this para is still existed in TS-R-1.</td>
</tr>
<tr>
<td>IAEA/D24/03</td>
<td>New</td>
<td>562(b)</td>
<td>562(b). “Packages, overpacks and freight containers containing radioactive material and unpackaged radioactive material shall be segregated during transport and during storage in transit: (b) From members of the critical group of the public representative person, in areas where the public has regular access, by distances calculated using a dose</td>
<td>ICRP and the BSS now use the concept of the representative person. There is an explanatory note to the definition of representative person in the BSS to state that the concept of critical group remains valid. Has TRANSSC considered using “” in para 562(b)?</td>
</tr>
<tr>
<td>E/D24/09</td>
<td>CS-05; T21 E/120D/12</td>
<td>570 (old 566bis)</td>
<td>criterion of 1 mSv in a year and conservative model parameters T22: accepted as modified in draft 2.42</td>
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<tr>
<td>USA/d24/11</td>
<td>CS-05; T21</td>
<td>570</td>
<td>To keep the paragraph 570 is not agree with the resolution of comments E/120D/12; N/120D/04; RA/120D/31, by CS-143 that accepted to delete the paragraph because it was a duplication of 417. The provisions on 570 should be merged with those in 417.</td>
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</table>

570. *Fissile material* meeting one of the provisions (a)-(f) of para. 417 is excepted from the requirement to be transported in *packages* that are classified as FISSILE if the following *consignment* conditions are met:

(a) Only one of the provisions (a)-(f) is allowed per *consignment*;
(b) Only one approved *fissile material* in *packages* classified in accordance with para. 417(f) is allowed per *consignment* unless multiple materials are authorized in the certificate of approval;
(c) *Fissile material* in *packages* classified in accordance with para. 417(c) shall be transported in a *consignment* with no more than 45 g of *fissile nuclides*;
(d) *Fissile material* in *packages* classified in accordance with...
para. 417(d) shall be transported in a *consignment* with no more than 15 g of *fissile nuclides*;
(e) Unpackaged or packaged *fissile material* classified in accordance with para. 417(e) shall be transported under *exclusive use* on a *conveyance* with no more than 45 g of *fissile nuclides.  

*Paragraph and all cross references should be deleted.*

T22: maintain para.570 in section V

| USA/d24/12 | IATA/120D/02 | 570(a) | Only one of the provisions (a)-(f) of para. 417 is allowed per *consignment*; T22: accepted | To improve clarity. |
| CDN/D24/23 | IATA/120D/02 | 579bis | T22: see CDN/D24/21 | Move to TS-G-1.1 as discussed at TRANSSC 21. |
| E/D24/10 | IATA/120D/02; IATA/120D/03; IATA/120D/04; IATA/120D/05; IATA/120D/06 | 579bis 580bis 581 bis 582bis 583bis | T22: see CDN/D24/21 | **Remark**: These changes are included in the document *Table of changes draft 2.4. TS-R-1* but they are not included in the document *DS437Draft2.4TSR120XXclear8April11 (¿?)*  

For all of them the 120 days comments resolution states:  
TRANSSC 21: Don’t add text to TS-R-1, but consider for TS-G-1.1. TSU: retain text for
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| 56   | Further comments  
In several of those new paragraphs the term ‘dangerous goods transport document’ is used. However, that term belongs to modal regulations, as the ICAO Technical Instructions. The term generally used by the TS-R-1 is ‘transport documents’ (current paras. 544 and 552). To use ‘dangerous goods document’ and other particular references to general dangerous goods requirements is very confused for users of TS-R-1. Each international modal regulation shall adapt the general terminology used by the TS-R-1 to each particular case. It is not adequate to try to adapt the TS-R-1 to each particular case of international modal regulations. That may make very confuse the TS-R-1. So, if this new paragraphs are finally accepted the terminology should be adapted to that used in TS-R-1 |
| B/D24/04 | IATA//120D/02 => IATA/120D/06  
579bis => 583bis  
T22: see CDN/D24/21  
Keep the decision of TRANSS21: Don’t add text to TS-R-1, but consider for TS-G-1.1 |
| F/D24/13 | IATA//120D/02  
579bis, 580bis, 581bis, 582bis, 583bis.  
T22: see CDN/D24/21  
In DS/437 draft 2.4 do not insert para 579bis, 580bis, 581bis, 582bis, 583bis since the relevant requirements are not related to any specificity of radioactive materials. |
| CDN/D24/22 | 580 and 581  
T22: UPU will discuss the proposal next week.  
Modifications to paras 580 and 581 were pending discussion with the UPU and this information has not been provided therefore it is
| CDN/D24/24 | 580bis | None T22: see CDN/D24/21 | Move to TS-G-1.1 as discussed at TRANSSC 21. |
| CDN/D24/25 | 581bis | None T22: see CDN/D24/21 | Move to TS-G-1.1 as discussed at TRANSSC 21. |
| CDN/D24/26 | 582bis | None T22: see CDN/D24/21 | Move to TS-G-1.1 as discussed at TRANSSC 21. |
| CDN/D24/27 | 583bis | None T22: see CDN/D24/21 | Move to TS-G-1.1 as discussed at TRANSSC 21. |
| CDN/D24/28 | CS-32, CS-05, CS-19 amended, TM 38941. T20: France will provide more information during 120-day comment, | 606 | T22: pass this comment to TS-G1.1 How will this be implemented? Is there sufficient guidance developed to assist applicant and competent authority in ensuring that these requirements are met? |
| D/D24/15 | E/120D/14 | 617 | 617. A *package* shall be so designed that it provides sufficient shielding to ensure that, under routine conditions of transport and with the maximum *radioactive contents* that the *package* is designed to contain, the *radiation level* Para. 516 must be added for completeness (reference to 5 μSv/h for excepted packages). |
at any point on the external surface of the package would not exceed the values specified in paras 516, 527 and 528, as applicable, with account taken of paras 566(b) and 573.

T22: accepted this proposal including para 516

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| E/D24/11 | WNTI/120D/24 | 617 (old 615 bis) | 617. **A package shall be so designed that it provides sufficient shielding to ensure that, under routine conditions of transport and with the maximum radioactive contents that the package is designed to contain, the radiation level at any point on the external surface of the package would not exceed the values specified in paras 516, 527 and 528, as applicable, with account taken of paras 566(b) and 573.**

T22: accepted this proposal including para 516

The 120 days comments resolution states: TRANSSC 21: reject to delete 615bis. 615bis is retained as draft 1.1.

The TRANSSC 21 conclusion is considered adequate, but it is necessary to add a cross reference to the para. 516 for completeness (reference to 5 μSv/h for excepted packages)

So, it is proposed that the para. 617 says:

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| USA/d24/13 | WNTI/120D/24, T21 | 617 | 617. **A package shall be so designed that it provides sufficient shielding to ensure that, under routine conditions of transport and with the maximum radioactive contents that the package is designed to contain, the radiation level at any point on the external surface of the package would not exceed the values specified in paras 527 and 528, as**

Personal notes from TRANSSC 21 approved the deletion proposed by WNTI and accepted by CSM 143.
applicable, with account taken of paras 566(b) and 573.
   a)  **T22:** TRANSSC 21: reject to delete 615bis. 615bis is retained as draft 1.1.

| F/D24/14 | 634 | 634. Subject to *multilateral approval*, *packages* designed to contain 0.1 kg or more of uranium hexafluoride may be transported if the *packages* are designed:

   [...] In all other respects, the requirements specified in paras 629–631631-633 shall be satisfied.

   **T22:** Editorial change was made.

| CDN/D24/29 | 673 | 671 673. *Fissile material* shall be transported so as to:

   (a)  Maintain subcriticality during *routine routine*, normal and accident conditions of transport; in particular, the following contingencies shall be considered:

   (i)  Leakage of water into or out of *packages*;

   (ii) Loss of efficiency of built-in neutron absorbers or moderators;

   (iii) Rearrangement of the contents either within the *package* or as a result of loss from the *package*;

   (iv) Reduction of spaces within or between *packages*;

| Editorial: |  | (a) Replace “routine” with “routine“ (Typo)

(b) (i) Delete “634” |
<table>
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<th>Reference</th>
<th>Paragraph</th>
<th>Text</th>
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</table>
| 673  | CS-167 Meeting Report page 18. CS-19 amended | (b) | ...\(\text{packages containing fissile material}\)…” and
...peculiar to the radioactive properties of the material; and
...Specified in Of paras, 635 637 and 673 –683 unless excepted by para. 417.:
...Of paras 673–683 676–686, unless excepted by paras 417, 672 or 672bis 674 or 675. T22: Editorial change was made

1/ In sub-para. (b) (i), the reference to para. 634 should be deleted and an exception of application of the para. 636 have to be made for unpackaged fissile material.
2/ Editorial, the sub-para (b) (iii) should be improved as proposed.

| 674  |  | (v) | Packages becoming immersed in water or buried in snow; and
(vi) Temperature changes.

(b) Meet the requirements:
(i) Of para. 634 636 for packages containing fissile material;:
(ii) Prescribed elsewhere in these Regulations which that pertain to the radioactive properties of the material; and
(iii) Specified in Of paras, 635 637 and 673 –683 unless excepted by para. 417.:
(iv) Of paras 673–683 676–686, unless excepted by paras 417, 672 or 672bis 674 or 675. T22: Editorial change was made

| 674  | CS-167 | | Packages containing fissile material that meet one of the provisions of subparas (a)–(c) of this paragraph are excepted from the requirements of paras 6756–686. T22: Editorial change was made

| 674  | CS-167 | | Packages containing fissile Editorial: add:“and the following sentence” to
| IAEA/D24/08 | CS-167 | 674 (c) (iii) | The CSI of the package is calculated using the following formula: 
\[
\text{CSI} = 50 \times 2 \times \left\{ \frac{\text{mass of U-235 in package (g)}}{Z_{450}} + \frac{\text{mass of other fissile nuclides in package (g)}}{Y_{280}} \right\}
\]
where the values of Z and Y are taken from Table 13. The value of Z shall be that for 100% enriched uranium. T22: accepted this proposal. | If one column in Table 13 is accepted by TRANSSC. The numbers for “X” and “Y” for 100% enrichment have no choice. And also the value for “Y” in all formulas in this para should be changed to 280. |
| E/D24/12 | Several CS-167 | 674 (old 672) | 674. Packages containing fissile material that meet one of the provisions | It is proposed to add: “and the following sentence” to make clear that also the sentence |
of subparas (a)–(c) and the following sentence of this paragraph are excepted from the requirements of paras 676–686. The total mass of beryllium, hydrogenous material enriched in deuterium, graphite and other allotropic forms of carbon in an individual package shall not be greater than the mass of fissile nuclides in the package except where their total concentration does not exceed 1 g in any 1000 g of material. Beryllium incorporated in copper alloys up to 4% in weight of the alloy does not need to be considered. (a) Packages containing fissile material in any form provided that:………

T22: accepted as modified in draft 2.42

| T22: Editorial change was made |
| CDN/D24/30 | 675 | **675. Packages containing not more than 10^3 1000 g of plutonium are excepted from the application of paras 673–683 673–683 676-686 provided that:** |
| Editorial (references) Replace 673-683 with 676-686. |

<p>| D/D24/17 | CS-19 amended, CS-167 Meeting Report page 18. | 675 | To make this more clear add the following sentence: <strong>If uranium is present with the plutonium, the mass of uranium shall be no more than 1% of the mass of the</strong> |
| According to the discussion amongst criticality specialists, the possible presence of fissile uranium has to be limited for use of this paragraph (the intention of this paragraph has always been the shipment of nearly pure |</p>
<table>
<thead>
<tr>
<th>Document Code</th>
<th>Action</th>
<th>Paragraph</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>UA/D24/02</td>
<td>New</td>
<td>685 (a)</td>
<td>T22: accepted this proposal. Modify the text «Hydrogenous moderation between the packages...» as follows: “Optimum hydrogenous moderation between and inside the packages...” T22: rejected this proposal. This is a new issue for next review cycle. Para. 680 provides for criticality assessment of a package in case of water ingress or egress (for hydrogenous packages). It is not clear why para. 685 assumes that water may appear only between packages but not inside them in case of emergencies related to water ingress (flooding, rain, etc.). The addition «Optimum hydrogenous moderation ...» determines what state of hydrogenous moderation should be considered in package criticality analysis.</td>
</tr>
<tr>
<td>F/D24/17</td>
<td></td>
<td>802</td>
<td>T22: see conclusion of footnote (h) of table 2 Concerning calculation of the alternative activity limits for an exempt consignment of instruments and articles (see sub-para. (f)), the requirements regarding the approval procedure itself have to be defined. Those requirements should be defined on the basis of the German proposal of 29th March 2011 (F Nitsche).</td>
</tr>
<tr>
<td>USA/d24/14</td>
<td>See D/D24/01</td>
<td>802 (a)(iii) Fissile material excepted under 417(f) (see paras 805 and 806) (g) Fissile material excepted under 417(f) (see paras 805 and 806) T22: keep it as it is Approval will not require a certificate of competent authority but will be approved in the same manner as alternative A values. Accordingly, the citation should stand alone.</td>
<td></td>
</tr>
</tbody>
</table>
| CDN/D24/31    |        | 805       | 804bis 805. A fissile material to be excepted from the FISSILE classification fissile FISSILE, according to in accordance with with Editorial Add “the” before FISSILE
Table 1, under para. 417(f) shall require multilateral approval. An application for approval shall include: ...
T22: accepted as modified in draft 2.42

| D/D24/18 | See USA/24D/14 | 805 | b) APPROVAL of other MATERIAL FOR EXCEPTION FROM CLASSIFICATION AS FISSILE

805. The design of a fissile material excepted from classification as FISSILE in accordance with Table 1, under para. 417(f) shall require multilateral approval. An application for approval shall include:
(a) A detailed description of the material; particular reference shall be made to both physical and chemical states.
(b) A statement of the tests that have been done and their results, or evidence based on calculation methods to show that the material is capable of meeting the requirements specified in para. 606;
(c) A specification of the applicable management system as required in para. 306;
(d) A statement of specific actions to be taken prior to shipment.
T22: accepted as modified in draft 2.42

Editorial:
<table>
<thead>
<tr>
<th>Country</th>
<th>Document</th>
<th>Paragraph</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA/d24/15</td>
<td>805</td>
<td>c) APPROVAL of other ADDITIONAL MATERIAL FOR EXCEPTION FROM CLASSIFICATION AS FISSILE</td>
<td>For consistency with the heading before para 606 (REQUIREMENTS FOR ADDITIONAL MATERIAL FOR EXCEPTION FROM CLASSIFICATION AS FISSILE) T22: accepted as modified in draft 2.42</td>
</tr>
<tr>
<td>F/D24/18</td>
<td>817</td>
<td>(b) … v) The packaging was not manufactured or modified after 31 December 2003 T22: Editorial change was made</td>
<td>Editorial probably. The last sentence should be the point v).</td>
</tr>
<tr>
<td>B/D24/05</td>
<td>817</td>
<td>T22: no proposal on-going discussion in RASSC and WASSC. Noting the issue.</td>
<td>A package prepared for transport prior to 31 December 2003 is not ready to be transported but in storage. Date or possibility need to be reconsidered seeing this kind of package prepared 10 years ago could not still been considered as “prepared for transport”</td>
</tr>
<tr>
<td>F/D24/19</td>
<td>CS-11, TM-38941 T20: amended CS-19 re-organized.</td>
<td>818</td>
<td>(h) The package design has not been modified after the date of enforcement of the edition of the Regulations that followed the one under which the package was approved, unless to improve safety. T22: accepted this proposal to delete this subpara</td>
</tr>
<tr>
<td>CDN/D24/32</td>
<td>818 (h)</td>
<td>(gh) The package design has not been modified during transitional period after the date of enforcement of the edition of the Regulations that followed the one under which the package was approved, unless to</td>
<td>Delete this sub-paragraph. It appears to be in contradiction with the footnote introduced at the beginning of section VIII. This sub-paragraph would be acceptable if it only applied to the 1973 and 1985 Editions of the regulations.</td>
</tr>
<tr>
<td>Date</td>
<td>Proposal</td>
<td>Paragraph</td>
<td>Comment</td>
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</tr>
<tr>
<td>D/D24/19</td>
<td>F/120D/26</td>
<td>818 (h)</td>
<td>T22: accepted this proposal to delete this subpara</td>
</tr>
<tr>
<td>E/D24/13</td>
<td>F/120D/26</td>
<td>818 (h)</td>
<td>The proposal of F/120D/26 is better than current text:</td>
</tr>
<tr>
<td>D/D24/20</td>
<td>F/120D/27</td>
<td>819 and 820</td>
<td>817bis No new manufacture of packages designed to meet the</td>
</tr>
</tbody>
</table>
provisions of the 1973, 1973 (As Amended), 1985, and 1985 (As Amended 1990) Editions of these Regulations shall be permitted to commence.

T22: accept this proposal as modified in draft 2.42. Delete paras 819 and 820 and its implementation in practice it is clear that there is no new manufacture of 73-designs since 1/1/1996 (para. 714, 1985 Edition) and no new manufacture of 85-designs since 1/1/2007 (para. 817, 1996 Edition). Based on this both paras 819 and 820 can be combined in one para without any reference to former dates as follows (as proposed by TRANSSC 20, WG 2 and the proposed change under b) is equivalent to the wording of para. 822, last sentence):

d) delete 819 and 820

e) new para. 817bis:

| B/D24/06 | 821 | […] before xxdatexx may continue in transport and may continue to be classified as non-fissile or fissile excepted under para. 560 (a), (b) or (d) of the 1985 or 1985 (As Amended 1990) Edition or under para. 672 (a)(i) or (iii) of the 1996 or 2005 Edition or under para. 417(a)(i) or (iii) of the 2009 Edition of these Regulations, except that the consignment limits in Table 4 of the 2009 Edition of these Regulations shall apply to the conveyance. The consignment shall be transported under exclusive use and subject to multilateral approval of shipment.

T22: see CDN/D24/33

| CDN/D24/3 | CS-05 | 821 | No new text is being proposed but the text |
### 3

<table>
<thead>
<tr>
<th>Date</th>
<th>Acronym</th>
<th>Paragraph</th>
<th>Text</th>
<th>Note</th>
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</thead>
<tbody>
<tr>
<td>3/04/2014</td>
<td>T22;</td>
<td>821</td>
<td>before <strong>xxdatexx</strong> may continue in transport and may continue to be classified as non-fissile/ or fissile-excepted under para. 417(a)(i) or (iii) of <strong>TS-R-1 the 2009 Edition of these Regulations</strong> except that the <strong>consignment limits</strong> in Table 4 of <strong>TS-R-1 the 2009 Edition of these Regulations</strong> shall apply to the <strong>conveyance</strong>. The <strong>consignment shall be transported under exclusive use and subject to multilateral approval of shipment</strong> approval. <strong>T22: the date 2014. accepted as modified in draft 2.42</strong> needs to be finalized as a date is required.</td>
<td>In addition, it is unclear as to which edition of the regulations it is referring to.(2009 or 20XX). Do you use the exceptions from the 2009 Edition but Table 4 from the 20XX Edition? If the intent is to make reference to the 2009 Edition then it is suggested to state TS-R-1 2009 Edition. If it is to this new edition, suggest referring to 20XX Edition of TS-R-1.</td>
</tr>
<tr>
<td>D/D24/21</td>
<td>E/120D/01</td>
<td>821</td>
<td>….. The <strong>consignment shall be transported under exclusive use and subject to multilateral approval of shipment</strong>. <strong>T22: accepted as modified in draft 2.42</strong> The last sentence requires multilateral approval. There is no approval procedure established for this kind of material and it is unnecessary for this transitional provision. Reference to multilateral approval in the last sentence of para. 821 must be deleted as follows:</td>
<td></td>
</tr>
<tr>
<td>E/D24/14</td>
<td>No specific comments. The proposal comes from CS-05</td>
<td>821</td>
<td>A simpler alternative may be: Packages excepted from the requirements for fissile materials under the 2009 and earlier Editions of these Regulations that were prepared for transport before <strong>xxdatexx</strong> may continue in transport classified as non-fissile/ or fissile-excepted provided that; <strong>First comment:</strong> The reference to paragraphs of specific editions of the TS-R-1 will complicate very much to express the same provision in the Modal Regulations, since the TS-R-1 editions doesn’t have a <strong>one to one</strong> correspondence with the Modal editions (i.e.: the 1996 TS-R-1 edition was the base for several UN editions).</td>
<td></td>
</tr>
</tbody>
</table>
T22: accepted as modified in draft 2.4

**Second comment:**
To limit the total mass of fissile nuclides to the conveyance and to require the transport be carried out under exclusive use is considered adequate; however, to require a multilateral approval for the shipments means excessive, taking into account the limitation of the mass per conveyance and the control of the shipment by an unique consignor, which implies an important control of the risk. It is proposed to substitute the multilateral approval requirement by a requirement of previous notification to the competent authorities. This notification would be enough to the competent authority carries out the necessary control on the transport operation.

<p>| F/D24/20 | CS-05 | 821 | …before xxdatexx enforcement of this Edition of this Regulations may continue in transport and may continue to be classified as non-fissile or fissile- excepted under para. 417(a)(i) or (iii) of the 2009 Edition of these Regulations except that the consignment limits in Table 4 of the 2009 Edition of these Regulations shall apply to the conveyance. The consignment shall be transported under exclusive use and subject to multilateral approval of | The aim of this proposal is to solve the date problem. |</p>
<table>
<thead>
<tr>
<th>Reference</th>
<th>Comment</th>
<th>Page</th>
<th>Action</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>GB/D24/01</td>
<td>GB/120D/25</td>
<td>821</td>
<td>T22: accepted as modified in draft 2.42</td>
<td>There is no obligation on operators to make an effort to transport already loaded packages under the new arrangements if possible.</td>
</tr>
<tr>
<td>J/D24/02</td>
<td></td>
<td>821</td>
<td>T22: accepted as modified in draft 2.42</td>
<td>The current draft described that packages that were prepared for transport either by the items (a) or (b) before xxdatesxx may continue to be..... The time limit shall be specified in the TRANSSC.</td>
</tr>
<tr>
<td>CDN/D24/34</td>
<td></td>
<td>824</td>
<td></td>
<td>820 824. <em>Multilateral approval</em> shall be required for: <strong>a 3000</strong> T22: editorial change was made</td>
</tr>
<tr>
<td>USA/D24/16</td>
<td>CS-32&lt;br&gt;CS-05&lt;br&gt;T20: amended&lt;br&gt;CS17</td>
<td>831 (c)</td>
<td>FE <em>Fissile material that requires multilateral approval to be excepted from classification as FISSILE, in accordance with Table 1 complying with the requirements of para 606</em> T22: accepted this proposal</td>
<td>To correct editing error.</td>
</tr>
<tr>
<td>D/D24/25</td>
<td>ANNEX I</td>
<td></td>
<td>T22: accepted</td>
<td>Consistency: If the proposal for multilateral approval for alternative activity limits for an exempt consignment of instruments or articles is accepted it must also be included in ANNEX I.</td>
</tr>
<tr>
<td>USA/D24/17</td>
<td>CS-32&lt;br&gt;CS-05&lt;br&gt;T20: amended&lt;br&gt;CS167&lt;br&gt;see USA/d24/16</td>
<td>Annex I (Part 4), Page 112,</td>
<td>Fissile excepted material from classification as FISSILE, in accordance with <strong>para 606 in accordance with Table 1</strong> T22: accepted this proposal</td>
<td>To correct editing error.</td>
</tr>
<tr>
<td>D/D24/24</td>
<td>ANNEX I</td>
<td></td>
<td></td>
<td>Editorial:</td>
</tr>
<tr>
<td>Document Reference</td>
<td>Section</td>
<td>Text</td>
<td>Actions</td>
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<tr>
<td>(Part 4), para 805</td>
<td></td>
<td>classification as FISSILE, in accordance with in accordance with Table 1</td>
<td>T22: Editorial changes was made</td>
<td></td>
</tr>
<tr>
<td>B/D24/07</td>
<td>Annex III</td>
<td><a href="k">…</a> Packages excepted from the requirements for fissile materials under earlier Editions of these Regulations in accordance with the provisions of para 821.</td>
<td>Add:</td>
<td></td>
</tr>
<tr>
<td>D/D24/26</td>
<td>ANNEX III</td>
<td>(k) Packages containing fissile material classified as non-fissile or fissile excepted under para. 417(a)(i) or (iii) of the 2009 Edition of these Regulations (see para. 821).</td>
<td>Consistency: results from new para. 821.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T22: accepted this proposal</td>
<td>Fissile excepted material excepted from classification as FISSILE, in accordance with in accordance with Table 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The following consignments are required to be shipped under exclusive use:</td>
<td>The following consignments are required to be shipped under exclusive use:</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>…</td>
<td>…</td>
<td></td>
</tr>
<tr>
<td>F/D24/1</td>
<td>ANNEX VI and Summary</td>
<td>T20: accepted</td>
<td>Contents of ANNEX VI are unknown. When available, this annex should be submitted to Member States 120 day comments. The numbering should be changed to ANNEX IV?</td>
<td></td>
</tr>
<tr>
<td>USA/d24/3</td>
<td>Table 1</td>
<td>UN 3XXX RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - URANIUM HEXAFLUORIDE, less than 0.1 kg per package, non-fissile or fissile-excepted. (Change should be carried</td>
<td>Correctness</td>
<td></td>
</tr>
<tr>
<td>B/D24/02</td>
<td>USA/120D/12</td>
<td>Table 2</td>
<td>T22: accepted as draft 2.42</td>
<td>For Kr-85 the reference to the footnote (h) has not the same format as for the other concerned radionuclides: T(H)-3, Th-228 and Th-232</td>
</tr>
<tr>
<td>CDN/D24/12</td>
<td>Table 2</td>
<td>T22: footnote (h) is not in favour but there are broad supports to Germany’s proposal.</td>
<td>The requirements for footnote (h) have not been specified. The principles to be used in allowing an alternate activity limit for an exempt consignment is not clear, but needs to be. Should this be in accordance with the principles in the BSS?</td>
<td></td>
</tr>
<tr>
<td>IND/D24/05</td>
<td>USA/120 D/12</td>
<td>Table 2</td>
<td>T22: see CDN/D24/12</td>
<td>The proposed footnote (h) will dilute the essence of exemptions which are derived from the system of protection and safety complying with Basic Safety Standards. The referred report has not yet been endorsed by the agency. There are other radioisotopes like Am-241, Po-210, Pm-147, Ni-63, H-3, C-14, Ba-133 etc., which are abundantly used in many other consumer products. Keeping only exemption values for Kr-85, H-3 and Th-232 (used in lighting consumer products) open ended and leaving to the concerned competent authority of the country is not appropriate. There should be a rational approach for all the radioisotopes used in the consumer products.</td>
</tr>
<tr>
<td>E/D24/01</td>
<td>USA/120 D/12</td>
<td>Table 2 footnote h</td>
<td>T22: see CDN/D24/12</td>
<td>It is not acceptable to establish a specific procedure to define a different exemption value for a particular case.</td>
</tr>
</tbody>
</table>
The activity exemption values have to be established clearly by the Regulations for each radionuclide based on a risk/dose analysis that assures that below those values the radioactive material may be transported freely without risk in any scenario, independently if the radionuclide is content in an article or not.

Otherwise, if this system based on a multilateral procedure is finally established the decision on this problem is being transferred case by case to each competent authority, which may produce a dangerous un-harmonization on this important subject.

This procedure, which is really being introduced for solving the particular case of lamps incorporating radioactive material, would open the door to multiple future applications of approvals to increase the exemption values of other radionuclides regularly used in other articles or instruments as many consumer products.

Additionally, it is not adequate to speak about ‘articles and instruments’ in a general way, since any equipment or system containing radioactive material (industrial gauges, for example) may be considered affected by this foot note.
<table>
<thead>
<tr>
<th>D/D24/22</th>
<th><strong>TIC/120D/01</strong></th>
<th>Table 2, footnote (h)</th>
<th><strong>T22:</strong> CRP has identified the issue that need to be addressed with the review of BSS. No change to that in table 2 of TS-R-1 2009.</th>
<th>Change of activity concentration for exempt material for Ra-226 and 228, Th-nat and U-nat: These changes in Table 2 are not justified and additionally any change to such values should be done only in connection and harmony with BSS review/revision. The current limits must be maintained. The problem for NORM has been solved by revising para 107 (f).</th>
</tr>
</thead>
<tbody>
<tr>
<td>F/D24/8</td>
<td><strong>TIC/120D/01</strong></td>
<td>TABLE 2, footnote (h)</td>
<td>new activity concentration limits for exempt material for Ra-226 Ra-228 U(NAT) and Th(NAT°) T22: CRP has identified the issue that need to be addressed with the review of BSS. No change to that in table 2 of TS-R-1 2009.</td>
<td>Comment 1: The proposed change is subject to harmonization with revised BSS. Comment 2: France supports BFS proposal to complete requirements relative to these issues.</td>
</tr>
<tr>
<td>D/D24/23</td>
<td>USA/120D/12</td>
<td>Table 2, footnote (h)</td>
<td>T22: see CDN/D24/12</td>
<td>Footnote (h) applicable to T(H-3), Kr-85, Th-228 and Th-232 (lamp industry): See Attachment 1 to this document</td>
</tr>
<tr>
<td>F/D24/12</td>
<td><strong>TIC/120D/01</strong></td>
<td>TABLE 8</td>
<td>See comment. T22: Editorial change was made.</td>
<td>Delete footnote reference “d” in the title of table 8 in DS437 draft 2.4.</td>
</tr>
<tr>
<td>USA/d24/10</td>
<td>New</td>
<td>Table 11, footnote b and c</td>
<td>The consignment shall be so handled and stowed that the sum of CSIs in any group does not exceed 50, and that each group is handled and stowed so as to maintain a spacing of at least 6 m from all other groups, that the groups are separated from each other. by at least 6 m. T22: accepted this proposal</td>
<td>The text of the footnote should be consistent with the text of para 569 where there is an emphasis on maintaining the 6m spacing.</td>
</tr>
</tbody>
</table>
Comments and proposal regarding USA/120D/12 (alternative activity limits for an exempt consignment of instruments or articles for T(H-3), Kr-85, Th-228 and Th-232)

Comments:
The US proposal is using a footnote to the above mentioned nuclides in Table 2 of TS-R-1 to provide a specific exemption option to the lamp industry. It is not justified why such an option within the regulatory framework of TS-R-1 is restricted to only these radionuclides and should not also be applicable to others.

In addition there are no requirements proposed regarding the approval procedure itself (e.g. application, assessment, certificate,…) which makes it rather complicated to achieve a harmonised implementation in practice and which is not consistent with other approval procedures in TS-R-1.

If such a new exemption option is basically acceptable then another way of its implementation into TS-R-1 is proposed as described in the following.

Proposal to introduce alternative activity limits for an exempt consignment of instruments or articles

1) Insert a new para. 403bis following para. 403:

403bis. For radioactive material in instruments or articles in which the radioactive material is enclosed in or is included as a component part of the instrument or other manufactured article and which meet para. 423 (c) alternative basic radionuclide values to those in Table 2 for the activity limit for an exempt consignment are permitted subject to multilateral approval. Such alternative activity limits for an exempt consignment shall be calculated in accordance with the principles set out in the BSS.

2) Extend para. 802 by adding the following:

(f) Calculation of alternative activity limits for an exempt consignment of instruments or articles (see para. 403bis).

3) Insert a new heading and new paras 802bis and 802bis1 in Section VIII following para. 802:
APPROVAL OF ALTERNATIVE ACTIVITY LIMITS FOR AN EXEMPT CONSIGNMENT OF INSTRUMENTS OR ARTICLES

802bis. Alternative activity limits for an exempt consignment of instruments or articles according to para. 403bis shall require multilateral approval. An application for approval shall include: *(remark: the following list is a slightly revised version of the list proposed by IAEA- CS-05 for TS-G-1.1)*

(a) A detailed description of the item, its intended uses and the radionuclide(s) incorporated.
(b) The maximum activity of the radionuclide(s) in the item.
(c) The chemical and physical forms of the radionuclide(s) contained in the item.
(d) Details of the construction and design of the item, particularly as related to the containment and shielding of the radionuclide in routine, normal and accident conditions of transport.
(e) The applicable management system, including the quality testing and verification procedures to be applied to radioactive sources, components and finished products to ensure that the maximum specified quantities of radioactive material (see (b)) or the maximum radiation levels specified for the item (see (g)) are not exceeded, and that the items are constructed according to the design specifications.
(f) A description of the prototype tests for demonstrating the integrity of the product in normal use, and the results of these tests of possible misuse and damage.
(g) Maximum external radiation levels arising from the item and the measures taken for compliance assurance.
(h) The maximum number of items expected to be shipped per consignment and annually.
(i) Dose assessments in accordance with the principles and methodologies set out in the BSS, including individual doses to transport workers and members of the public and, if appropriate, collective doses arising from routine, normal and accident conditions of transport, based on representative transport scenarios the consignments are subject to.

802bis1. The competent authority shall establish an approval certificate stating that the approved alternative activity limit for an exempt consignment of instruments or articles meets para. 403bis and shall attribute to that certificate an identification mark.

4) Insert a new type code for approval for alternative activity limits for an exempt consignment of instruments or articles under para. 831 (c):

831 (c)

AL Alternative activity limits for an exempt consignment of instruments or articles
5) Insert a new heading and a new para. 833bis following para. 833:

Certificates for alternative activity limits for an exempt consignment of instruments or articles

833bis. Each certificate issued by a competent authority for alternative activity limits for an exempt consignment of instruments or articles according to para. 802bis1 shall include the following information:

(a) The competent authority identification mark.
(b) The issue date and expiry date.
(c) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the exemption is approved.
(d) Specifications of the radionuclide(s), the approved alternative activity limit(s) for the exempt consignment(s) and the instrument(s) or article(s).
(e) Any restrictions or limitations for the instrument(s) or article(s) or the consignment(s), if applicable.
(f) Specification of the applicable management system.
(g) If necessary, any administrative or operational requirements for the consignment before and during transport.
(h) If deemed appropriate by the competent authority, reference to the identity of the applicant.
(i) Signature and identification of the certifying official.
(j) Reference to documentation that demonstrates compliance with para. 403bis.
IAEA glossary:

radiation level
[The corresponding dose rate expressed in millisieverts per hour.] (From Ref. [2].)

This usage is specific to the Transport Regulations, and should otherwise be avoided.

*equivalent dose, $HT$. The quantity $HT,R$, defined as:

where $DT,R$ is the absorbed dose delivered by radiation type R averaged over a tissue or organ T and $wR$ is the radiation weighting factor for radiation type R. When the radiation field is composed of different radiation types with different values of $wR$ the equivalent dose is:

Formula

- The unit of equivalent dose is the sievert (Sv), equal to 1 J/kg. The rem, equal to 0.01 Sv, is sometimes used as a unit of equivalent dose and effective dose.
- This should not be used in IAEA publications, except when quoting directly from other publications, in which case the value in sieverts should be added in parentheses.
- Equivalent dose is a measure of the dose to a tissue or organ designed to reflect the amount of harm caused.
- Values of equivalent dose to a specified tissue from any type(s) of radiation can be compared directly.

natural uranium. Uranium (which may be chemically separated) (AUS/D24/03) containing the naturally occurring distribution of uranium isotopes (approximately 99.28% uranium-238 and 0.72% uranium-235 by mass). (From Ref. [2].)
In all cases, a very small mass percentage of uranium-234 is present. The naturally occurring distribution of uranium isotopes including uranium-234 (approximately 99.285% uranium-238, 0.710% uranium-235 and 0.005% uranium-234 by mass) corresponds to approximately 48.9% uranium-234, 2.2% uranium-235 and 48.9% uranium-238 by activity.
Annex 6

DS 437 Draft 2.43 TS-R-1 20xx

IAEA SAFETY STANDARDS
for protecting people and the environment

Status: MS comments from the 120-day comment period were considered by CSs and TRANSSC 21

Approved by Coordination Committee in May 2011
Approved by TRANSSC 22, RASSC 30/WASSC 31 in June 2011 and NUSSC

Action status: Approval of the draft by CSS for publication

NOTE:

1) UN number for UF6 < 100 g will be communicated by UNECE at the end of 2011.
2) CONTRIBUTORS TO DRAFTING AND REVIEW and BODIES FOR THE ENDORSEMENT OF SAFETY STANDARDS are not completed.
3) Table of changes 2009 vs 20xx and relevant CS meeting reports can be find at:

Regulations
for the Safe Transport of Radioactive Material
20XX Edition

DRAFT SAFETY REQUIREMENT (draft 2.43)
DS437

Revision of TS-R-1

IAEA
International Atomic Energy Agency
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Section I

INTRODUCTION

BACKGROUND

101. These Regulations 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 Regulations are based on the Fundamental Safety Principles, Safety Fundamentals No. SF-1 [1], jointly sponsored by the European Atomic Energy Community (EAEC), the Food and Agriculture Organization of the United Nations (FAO), the IAEA, the International Labour Organization (ILO), the International Maritime Organization (IMO), the OECD Nuclear Energy Agency (NEA), the Pan American Health Organization (PAHO), the United Nations Environment Programme (UNEP) and the World Health Organization (WHO) and on the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, Safety Series No. 115 [2], jointly sponsored by the FAO, the IAEA, the ILO, the NEA, the PAHO and the WHO. Thus, compliance with these Regulations is deemed to satisfy the principles of the Basic Safety Standards in respect of transport. In accordance with Ref. [1], the prime responsibility for safety must rest with the person or organization responsible for facilities and activities that give rise to radiation risks.


103. In certain parts of these Regulations, a particular action is prescribed, but the responsibility for carrying out the action is not specifically assigned to any particular legal person. Such responsibility may vary according to the laws and customs of different countries and the international conventions into which these countries have entered. For the purpose of these Regulations, it is not necessary to make this assignment, but only to identify the action itself. It remains the prerogative of each government to assign this responsibility.

OBJECTIVE

104. The objective of these Regulations is to establish requirements that must be satisfied to ensure safety and to protect persons, property and the environment from the effects of radiation in 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;
(d) Prevention of damage caused by heat.
These requirements are satisfied firstly by applying a graded approach to contents limits for packages and conveyances and to performance standards applied to package designs, depending upon the hazard of the radioactive contents. Secondly, they are satisfied by imposing requirements on the design and operation of packages and on the maintenance of 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.

105. In the transport of radioactive material, the safety of persons and the protection of property and the environment are assured when these Regulations are complied with. Confidence in this regard is achieved through management system and compliance assurance programmes.

(f) SCOPE

106. These Regulations apply to the transport of radioactive material by all modes on land, water, or in the 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 loads of radioactive material and packages. A graded approach is applied in specifying the performance standards in these Regulations, which are characterized in terms of three general severity levels:

(a) Routine conditions of transport (incident free);
(b) Normal conditions of transport (minor mishaps);
(c) Accident conditions of transport.

107. These Regulations do not apply to any of the following:

(a) Radioactive material that is an integral part of the means of transport;
(b) Radioactive material moved within an establishment that is subject to appropriate safety regulations in force in the establishment and where the movement does not involve public roads or railways;
(c) Radioactive material implanted or incorporated into a person or live animal for diagnosis or treatment;
(d) Radioactive material in or on a person who is to be transported for medical treatment because the person has been subject to accidental or deliberate intake of radioactive material or to contamination;
(e) Radioactive material in consumer products that have received regulatory approval, following their sale to the end user;
(f) Natural material and ores containing naturally occurring radionuclides, which may have been processed, provided the activity concentration of the material does not exceed 10 times the values specified in Table 2, or calculated in accordance with paras 403, 403(a) and 404–407. For natural materials and ores containing naturally occurring radionuclides that are not in secular equilibrium the calculation of the activity concentration shall be performed in accordance with para. 405;
(g) Non-radioactive solid objects with radioactive substances present on any surface in quantities not in excess of the levels defined in para. 214.

108. These Regulations do not specify controls such as routeing or physical protection that may be instituted for reasons other than radiological safety. Any such controls shall
take into account radiological and non-radiological hazards, and shall not detract from the standards of safety that these Regulations are intended to provide.

109. Measures should be taken to ensure that radioactive material is kept secure in transport so as to prevent theft or damage and to ensure that control of the material is not relinquished inappropriately (see Annex I).

110. For radioactive material having subsidiary risks, and for transport of radioactive material with other dangerous goods, the relevant transport regulations for dangerous goods shall apply in addition to these Regulations.

(u) STRUCTURE

111. This publication is structured so that Section II defines the terms that are required for the purposes of these Regulations; Section III provides general provisions; Section IV provides activity limits and material restrictions used throughout these Regulations; Section V provides requirements and controls for transport; Section VI provides requirements for radioactive material and for packagings and packages; Section VII provides requirements for test procedures; and Section VIII provides requirements for approvals and administration.
(v) Section II
(w) DEFINITIONS
The following definitions shall apply for the purposes of these Regulations:

(x) \( A_1 \) and \( A_2 \)
201. \( A_1 \) shall mean the activity value of \textit{special form radioactive material} that is listed in Table 2 or derived in Section IV and is used to determine the activity limits for the requirements of these Regulations. \( A_2 \) shall mean the activity value of \textit{radioactive material}, other than \textit{special form radioactive material}, that is listed in Table 2 or derived in Section IV and is used to determine the activity limits for the requirements of these Regulations.

(y) Aircraft
202. \textit{Cargo Aircraft} shall mean any \textit{aircraft}, other than a \textit{passenger aircraft}, that is carrying goods or property.
203. \textit{Passenger aircraft} shall mean an \textit{aircraft} that carries any person other than a crew member, a carrier’s employee in an official capacity, an authorized representative of an appropriate national authority, or a person accompanying a \textit{consignment} or other cargo.

(z) Approval
204. \textit{Multilateral approval} shall mean \textit{approval} by the relevant \textit{competent authority} of the country of origin of the \textit{design} or \textit{shipment}, as applicable, and also, where the \textit{consignment} is to be transported \textit{through} or \textit{into} any other country, \textit{approval} by the \textit{competent authority} of that country.
205. \textit{Unilateral approval} shall mean an \textit{approval} of a \textit{design} that is required to be given by the \textit{competent authority} of the country of origin of the \textit{design} only.

(aa) Carrier
206. \textit{Carrier} shall mean any person, organization or government undertaking the carriage of \textit{radioactive material} by any means of transport. The term includes both \textit{carriers} for hire or reward (known as common or contract \textit{carriers} in some countries) and \textit{carriers} on own account (known as private \textit{carriers} in some countries).

(bb) Competent authority
207. \textit{Competent authority} shall mean any body or authority designated or otherwise recognized as such for any purpose in connection with these Regulations.

(cc) Compliance assurance
208. \textit{Compliance assurance} shall mean a systematic programme of measures applied by a \textit{competent authority} that is aimed at ensuring that the provisions of these Regulations are met in practice.

(dd) Confinement system
209. \textit{Confinement system} shall mean the assembly of \textit{fissile material} and \textit{packaging} components specified by the designer and agreed to by the \textit{competent authority} as intended to preserve criticality safety.

(ee) Consignee
210. \textit{Consignee} shall mean any person, organization or government that is entitled to take delivery of a \textit{consignment}.

(ff) Consignment
211. \textit{Consignment} shall mean any \textit{package} or \textit{packages}, or load of \textit{radioactive material}, presented by a \textit{consignor} for transport.
(gg) **Consignor**
212. Consignor shall mean any person, organization or government that prepares a consignment for transport.

(hh) **Containment system**
213. Containment system shall mean the assembly of components of the packaging specified by the designer as intended to retain the radioactive material during transport.

(ii) **Contamination**
214. Contamination shall mean the presence of a radioactive substance on a surface in quantities in excess of 0.4 Bq/cm$^2$ for beta and gamma emitters and low toxicity alpha emitters, or 0.04 Bq/cm$^2$ for all other alpha emitters.

215. Non-fixed contamination shall mean contamination that can be removed from a surface during routine conditions of transport.

216. Fixed contamination shall mean contamination other than non-fixed contamination.

(jj) **Conveyance**
217. Conveyance shall mean:
   (a) For transport by road or rail: any vehicle;
   (b) For transport by water: any vessel, or any hold, compartment, or defined deck area of a vessel;
   (c) For transport by air: any aircraft.

(kk) **Criticality safety index**
218. Criticality safety index (CSI) assigned to a package, overpack or freight container containing fissile material shall mean a number that is used to provide control over the accumulation of packages, overpacks or freight containers containing fissile material.

(ll) **Defined deck area**
219. Defined deck area shall mean the area of the weather deck of a vessel, or of a vehicle deck of a roll-on/roll-off ship or ferry, that is allocated for the stowage of radioactive material.

(mm) **Design**
220. Design shall mean the description of fissile material excepted under para. 417 (f), special form radioactive material, low dispersible radioactive material, package or packaging that enables such an item to be fully identified. The description may include specifications, engineering drawings, reports demonstrating compliance with regulatory requirements, and other relevant documentation.

(nn) **Exclusive use**
221. 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 these Regulations.

(oo) **Fissile nuclides and fissile material**
222. Fissile nuclides shall mean uranium-233, uranium-235, plutonium-239 and plutonium-241. Fissile material shall mean a material containing any of the fissile nuclides in quantities exceeding a total of 0.25 g per package or per consignment if shipped unpackaged. Excluded from the definition of fissile material is any combination of 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 0.25g.
(d) Any combination of a), b) and/or 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.

(pp) Freight container - small, large
223. Freight container shall mean an article of transport equipment that is of a permanent character and accordingly strong enough to be suitable for repeated use; specially designed to facilitate the transport of goods, by one or other modes of transport, without intermediate reloading, designed to be secured and/or readily handled, having fittings for these purposes. The term "freight container" does not include the vehicle. A small freight container shall mean a freight container that has an internal volume of not more than 3 m³. A large freight container shall mean a freight container that has an internal volume of more than 3 m³.

(qq) Intermediate bulk container
224. Intermediate bulk container (IBC) shall mean a portable packaging that:
(a) Has a capacity of not more than 3 m³;
(b) Is designed for mechanical handling;
(c) Is resistant to the stresses produced in handling and transport, as determined by tests.

(rr) Low dispersible radioactive material
225. 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.

(ss) Low specific activity material
226. 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.

(tt) Low toxicity alpha emitters
227. Low toxicity alpha emitters are: natural uranium, depleted uranium, natural thorium, uranium-235 or 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.

(uu) Management system
228. Management system shall mean a set of interrelated or interacting elements (system) for establishing policies and objectives and enabling the objectives to be achieved in an efficient and effective manner.

(vv) Maximum normal operating pressure
229. Maximum normal operating pressure shall mean 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.
230. *Overpack* shall mean an enclosure used by a single *consignor* to contain one or more *packages* and to form one unit for convenience of handling and stowage during transport.

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

232. *Packaging* shall mean one or more receptacles and any other components or materials necessary for the receptacles to perform the containment and other safety functions.

233. *Radiation level* shall mean the corresponding dose rate expressed in millisieverts per hour or microsieverts per hour.

234. *Radiation protection programme* shall mean systematic arrangements that are aimed at providing adequate consideration of radiation protection measures.

235. *Radioactive contents* shall mean the *radioactive material* together with any contaminated or activated solids, liquids and gases within the *packaging*.

236. *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.

237. *Shipment* shall mean the specific movement of a *consignment* from origin to destination.

238. *Special arrangement* shall mean those provisions, approved by the *competent authority*, under which *consignments* that do not satisfy all the applicable requirements of these Regulations may be transported.

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

240. Specific activity of a radionuclide shall mean the activity per unit mass of that nuclide. The specific activity of a material shall mean the activity per unit mass of the material in which the radionuclides are essentially uniformly distributed.

Surface contaminated object

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

Tank

242. Tank shall mean a portable tank (including a tank container), a road tank vehicle, a rail tank wagon or a receptacle that contains solids, liquids, or gases, having a capacity of not less than 450 L when used for the transport of gases.

Through or into

243. Through or into shall mean through or into the countries in which a consignment is transported but specifically excludes countries over which a consignment is carried by air, provided that there are no scheduled stops in those countries.

Transport index

244. Transport index (TI) assigned to a package, overpack or freight container, or to unpackaged LSA-I or SCO-I, shall mean a number that is used to provide control over radiation exposure.

Unirradiated thorium

245. Unirradiated thorium shall mean thorium containing not more than $10^{-7}$ g of uranium-233 per gram of thorium-232.

Unirradiated uranium

246. Unirradiated uranium shall mean uranium containing not more than $2 \times 10^3$ Bq of plutonium per gram of uranium-235, not more than $9 \times 10^6$ Bq of fission products per gram of uranium-235 and not more than $5 \times 10^{-3}$ g of uranium-236 per gram of uranium-235.

Uranium — natural, depleted, enriched

247. Natural uranium shall mean uranium (which may be chemically separated) containing the naturally occurring distribution of uranium isotopes (approximately 99.28% uranium-238 and 0.72% uranium-235, by mass). Depleted uranium shall mean uranium containing a lesser mass percentage of uranium-235 than natural uranium. Enriched uranium shall mean uranium containing a greater mass percentage of uranium-235 than 0.72%. In all cases, a very small mass percentage of uranium-234 is present.

Vehicle

248. Vehicle shall mean a road vehicle (including an articulated vehicle, i.e. a tractor and semi-trailer combination), railroad car or railway wagon. Each trailer shall be considered as a separate vehicle.

Vessel

249. Vessel shall mean any seagoing vessel or inland waterway craft used for carrying cargo.
(qqq) Section III
(rrr) GENERAL PROVISIONS
(sss) RADIATION PROTECTION

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

302. A radiation protection programme shall be established for the transport of radioactive material. The nature and extent of the measures to be employed in the programme shall be related to the magnitude and likelihood of radiation exposures. The programme shall incorporate the requirements of paras 301, 303–305, 311 and 562. Programme documents shall be available, on request, for inspection by the relevant competent authority.

303. For occupational exposures arising from transport activities, where it is assessed that the effective dose either:
(a) Is likely to be between 1 and 6 mSv in a year, a dose assessment programme via workplace monitoring or individual monitoring shall be conducted; or
(b) Is likely to exceed 6 mSv in a year, individual monitoring shall be conducted. When individual monitoring or workplace monitoring is conducted, appropriate records shall be kept.

(ttt) EMERGENCY RESPONSE

304. In the event of accidents or incidents during the transport of radioactive material, emergency provisions, as established by relevant national and/or international organizations, shall be observed to protect persons, property and the environment. Appropriate guidelines for such provisions are contained in Ref. [4].

305. Emergency procedures shall 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.

(uuu) MANAGEMENT SYSTEM

306. A management system based on international, national or other standards acceptable to the competent authority shall be established and implemented for all activities within the scope of the Regulations, as identified in para.106, to ensure compliance with the relevant provisions of these Regulations. Certification that the design specification has been fully implemented shall be available to the competent authority. The manufacturer, consignor or user shall be prepared:
(a) To provide facilities for inspection during manufacture and use;
(b) To demonstrate compliance with these Regulations to the competent authority. Where competent authority approval is required, such approval shall take into account and be contingent upon the adequacy of the management system.

(vvv) COMPLIANCE ASSURANCE

307. The competent authority shall assure compliance with these Regulations.
308. The relevant competent authority shall arrange for periodic assessments of the radiation doses to persons due to the transport of radioactive material, to ensure that the system of protection and safety complies with the Basic Safety Standards [2].

309. In the event of non-compliance with any limit in these Regulations applicable to radiation level or contamination:

(a) The consignor, consignee, carrier and any organization involved during transport who may be affected, as appropriate, shall be informed of the non-compliance by:

(i) The carrier if the non-compliance is identified during transport; or

(ii) The consignee if the non-compliance is identified at receipt.

(b) The carrier, consignor or consignee, as appropriate, shall:

(i) Take immediate steps to mitigate the consequences of the non-compliance;

(ii) Investigate the non-compliance and its causes, circumstances and consequences;

(iii) Take appropriate action to remedy the causes and circumstances that led to the non-compliance and to prevent a recurrence of circumstances similar to those that led to the non-compliance;

(iv) Communicate to the relevant competent authority(ies) on the causes of the non-compliance and on corrective or preventive actions taken or to be taken.

(c) The communication of the non-compliance to the consignor and the relevant competent authority(ies), respectively, shall be made as soon as practicable and it shall be immediate whenever an emergency exposure situation has developed or is developing.

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

311. Workers shall 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.

312. Persons engaged in the transport of radioactive material shall receive training in the contents of these Regulations commensurate with their responsibilities.

313. Individuals such as those who classify radioactive material; pack radioactive material; mark and label radioactive material; prepare transport documents for radioactive material; offer or accept radioactive material for transport; carry or handle radioactive material in transport; mark or placard or load or unload packages of radioactive material into or from transport vehicles, bulk packagings or freight containers; or are otherwise directly involved in the transport of radioactive material as determined by the competent authority; shall receive the following training:

(a) General awareness/familiarization training:
(i) Each person shall receive training designed to provide familiarity with the general provisions of these Regulations.

(ii) Such training shall include a description of the categories of radioactive material; labelling, marking, placarding and packaging and segregation requirements; a description of the purpose and content of the radioactive material transport document; and a description of available emergency response documents.

(b) Function specific training: Each person shall receive detailed training concerning specific radioactive material transport requirements that are applicable to the function that person performs;

(c) Safety training: Commensurate with the risk of exposure in the event of a release and the functions performed, each person shall receive training on:

(i) Methods and procedures for accident avoidance, such as proper use of package handling equipment and appropriate methods of stowage of radioactive material.

(ii) Available emergency response information and how to use it.

(iii) General dangers presented by the various categories of radioactive material and how to prevent exposure to those hazards, including, if appropriate, the use of personal protective clothing and equipment.

(iv) Immediate procedures to be followed in the event of an unintentional release of radioactive material, including any emergency response procedures for which the person is responsible and personal protection procedures to be followed.

314. Records of all safety training undertaken shall be kept by the employer and made available to the employee if requested.

315. The training required in para. 313 shall be provided or verified upon employment in a position involving radioactive material transport and shall be periodically supplemented with retraining as deemed appropriate by the competent authority.
Radioactive material shall be assigned to one of the UN numbers specified in Table 1 in accordance with paras 408–434.

### TABLE 1. EXCERPTS FROM LIST OF UN NUMBERS, PROPER SHIPPING NAMES AND DESCRIPTIONS

<table>
<thead>
<tr>
<th>Assignment of UN numbers</th>
<th>PROPER SHIPPING NAME and description</th>
</tr>
</thead>
<tbody>
<tr>
<td>** Excepted package **</td>
<td></td>
</tr>
<tr>
<td>UN 2908</td>
<td>RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – EMPTY PACKAGING</td>
</tr>
<tr>
<td>UN 2909</td>
<td>RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – ARTICLES MANUFACTURED FROM NATURAL URANIUM or DEPLETED URANIUM or NATURAL THORIUM</td>
</tr>
<tr>
<td>UN 2910</td>
<td>RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – LIMITED QUANTITY OF MATERIAL</td>
</tr>
<tr>
<td>UN 2911</td>
<td>RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – INSTRUMENTS or ARTICLES</td>
</tr>
<tr>
<td>UN3xxx</td>
<td>RADIOACTIVE MATERIAL, EXCEPTED PACKAGE -URANIUM HEXAFLUORIDE, less than 0.1 kg per package, non-fissile or fissile-exceptioned</td>
</tr>
<tr>
<td>** Low specific activity material **</td>
<td></td>
</tr>
<tr>
<td>UN 2912</td>
<td>RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I), non-fissile or fissile-exceptioned</td>
</tr>
<tr>
<td>UN 3321</td>
<td>RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), non-fissile or fissile-exceptioned</td>
</tr>
<tr>
<td>UN 3322</td>
<td>RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-III), non-fissile or fissile-exceptioned</td>
</tr>
<tr>
<td>UN 3324</td>
<td>RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), FISSILE</td>
</tr>
<tr>
<td>UN 3325</td>
<td>RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-III), FISSILE</td>
</tr>
<tr>
<td>** Surface contaminated objects **</td>
<td></td>
</tr>
<tr>
<td>UN 2913</td>
<td>RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II), non-fissile or fissile-exceptioned</td>
</tr>
<tr>
<td>UN 3326</td>
<td>RADIOACTIVE MATERIAL, SURFACE</td>
</tr>
</tbody>
</table>
CONTAMINATED OBJECTS (SCO-I or SCO-II), FISSIONAL

| Type A package | UN 2915 | RADIOACTIVE MATERIAL, TYPE A PACKAGE, non-special form, non-fissile or fissile-excepted
|               | UN 3327 | RADIOACTIVE MATERIAL, TYPE A PACKAGE, FISSIONAL, non-special form
|               | UN 3332 | RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, non-fissile or fissile-excepted
|               | UN 3333 | RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, FISSIONAL

| Type B(U) package | UN 2916 | RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, non-fissile or fissile-excepted
|                  | UN 3328 | RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, FISSIONAL

| Type B(M) package | UN 2917 | RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, non-fissile or fissile-excepted
|                  | UN 3329 | RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, FISSIONAL

| Type C package | UN 3323 | RADIOACTIVE MATERIAL, TYPE C PACKAGE, non-fissile or fissile-excepted
|               | UN 3330 | RADIOACTIVE MATERIAL, TYPE C PACKAGE, FISSIONAL

| Special arrangement | UN 2919 | RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, non-fissile or fissile-excepted
|                   | UN 3331 | RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, FISSIONAL

| Uranium hexafluoride | UN 2977 | RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, FISSIONAL
|                     | UN 2978 | RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, non-fissile or fissile-excepted
|                     | UN3xxx  | RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, URANIUM HEXAFLUORIDE, less than 0.1 kg per package.

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a The “PROPER SHIPPING NAME” is found in the column “PROPER SHIPPING NAME and description” and is restricted to that part shown in CAPITAL LETTERS. In the cases of UN 2909, UN 2911, UN 2913 and UN 3326, where alternative proper shipping names are separated by the word “or”, only the relevant proper shipping name shall be used.

b The term “fissile-excepted” refers only to material excepted under para. 417.
**BASIC RADIONUCLIDE VALUES**

402. The following basic values for individual radionuclides are given in Table 2:
(a) $A_1$ and $A_2$ in TBq;
(b) Activity concentration limits for exempt material in Bq/g;
(c) Activity limits for exempt *consignments* in Bq.

**DETERMINATION OF BASIC RADIONUCLIDE VALUES**

403. For individual radionuclides:
(a) that are not listed in Table 2, the determination of the basic radionuclide values referred to in para. 402 shall require *multilateral approval*. For these radionuclides, activity concentrations for exempt material and activity limits for exempt *consignments* shall be calculated in accordance with the principles established in the BSSRef.[2]. It is permissible to use an $A_2$ value calculated using a dose coefficient for the appropriate lung absorption type, as recommended by the International Commission on Radiological Protection, if the chemical forms of each radionuclide under both normal and accident conditions of transport are taken into consideration. Alternatively, the radionuclide values in Table 3 may be used without obtaining *competent authority approval*.

(b) in instruments or articles in which the radioactive material is enclosed in or is included as a component part of the instrument or other manufactured article and which meet para. 423 (c), alternative basic radionuclide values to those in Table 2 for the activity limit for an exempt consignment are permitted and shall require *multilateral approval*. Such alternative activity limits for an exempt consignment shall be calculated in accordance with the principles set out in the BSS [2].

404. In the calculations of $A_1$ and $A_2$ for a radionuclide not in Table 2, a single radioactive decay chain in which the radionuclides are present in their naturally occurring proportions, and in which no daughter nuclide has a half-life either longer than 10 days or longer than that of the parent nuclide, shall be considered as a single radionuclide; and the activity to be taken into account and the $A_1$ or $A_2$ value to be applied shall be that corresponding to the parent nuclide of that chain. In the case of radioactive decay chains in which any daughter nuclide has a half-life either longer than 10 days or longer than that of the parent nuclide, the parent and such daughter nuclides shall be considered as mixtures of different nuclides.
<table>
<thead>
<tr>
<th>Radionuclide</th>
<th>$A_1$</th>
<th>$A_2$</th>
<th>Activity concentration limit for exempt material</th>
<th>Activity limit for an exempt consignment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(TBq)</td>
<td>(TBq)</td>
<td>(Bq/g)</td>
<td>(Bq)</td>
</tr>
<tr>
<td>Actinium (89)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ac-225 (a)</td>
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<td>$6 \times 10^{-3}$</td>
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<td>$1 \times 10^{-1}$</td>
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<tr>
<td>Ac-228</td>
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<td>$5 \times 10^{-1}$</td>
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<td>$1 \times 10^6$</td>
</tr>
<tr>
<td>Silver (47)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ag-105</td>
<td>$2 \times 10^0$</td>
<td>$2 \times 10^0$</td>
<td>$1 \times 10^2$</td>
<td>$1 \times 10^6$</td>
</tr>
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<td>Ag-108m (a)</td>
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<td>$7 \times 10^{-1}$</td>
<td>$1 \times 10^1$ (b)</td>
<td>$1 \times 10^6$ (b)</td>
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<td>Ag-110m (a)</td>
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<td>$4 \times 10^{-1}$</td>
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<td>$1 \times 10^6$</td>
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<td>$1 \times 10^4$ (b)</td>
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<tr>
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<td>$1 \times 10^{-3}$</td>
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<td>$1 \times 10^5$ (b)</td>
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<td>$3 \times 10^{-1}$</td>
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<td>As-77</td>
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<td>$7 \times 10^{-1}$</td>
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<td>Astatine (85)</td>
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<td>$5 \times 10^{-1}$</td>
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<td>$1 \times 10^7$</td>
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<td>Gold (79)</td>
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<tr>
<td>Au-193</td>
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<td>$2 \times 10^0$</td>
<td>$1 \times 10^2$</td>
<td>$1 \times 10^7$</td>
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<tr>
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<tr>
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<td>Au-198</td>
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<tr>
<td>Barium (56)</td>
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<tr>
<td>Ba-131 (a)</td>
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<td>Ba-133m</td>
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<tr>
<td>Ba-140 (a)</td>
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<td>$3 \times 10^{-1}$</td>
<td>$1 \times 10^1$ (b)</td>
<td>$1 \times 10^5$ (b)</td>
</tr>
<tr>
<td>Beryllium (4)</td>
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<td>Be-7</td>
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<td>$1 \times 10^3$</td>
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<tr>
<td>Element</td>
<td>MassNumber</td>
<td>Stability</td>
<td>Halflife (s)</td>
<td>Range (s)</td>
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<td>Bi-205</td>
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</tr>
<tr>
<td>Bi-206</td>
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</tr>
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<td>Bi-210</td>
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<td>83</td>
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<td>Carbon</td>
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<td>Curium</td>
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<td>1 × 10^5</td>
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<td>Cm-240</td>
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<td>4 × 10^1</td>
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<tr>
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<td>Element</td>
<td>Isotope</td>
<td>Value 1</td>
<td>Value 2</td>
<td>Value 3</td>
</tr>
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<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Eu-232</td>
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<td>1 × 10^{-2}</td>
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<td>1 × 10^{-3}</td>
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<td>1 × 10^4</td>
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<td>Eu-246</td>
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</tr>
<tr>
<td>Eu-247 (a)</td>
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<td>1 × 10^{-3}</td>
<td>1 × 10^0</td>
<td>1 × 10^4</td>
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<td>1 × 10^4</td>
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<td>Cobalt (27)</td>
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<td></td>
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<tr>
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<td>1 × 10^5</td>
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**Plutonium (94)**

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**Radium (88)**

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**Rubidium (37)**

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**Rhenium (75)**

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<td>Thallium (81)</td>
<td>(1 \times 10^{1})</td>
<td>(4 \times 10^{0})</td>
</tr>
<tr>
<td>Tl-201</td>
<td>(2 \times 10^{0})</td>
<td>(2 \times 10^{0})</td>
</tr>
<tr>
<td>Tl-204</td>
<td>(1 \times 10^{1})</td>
<td>(7 \times 10^{-1})</td>
</tr>
<tr>
<td>Thulium (69)</td>
<td>(7 \times 10^{0})</td>
<td>(8 \times 10^{-1})</td>
</tr>
<tr>
<td>Tm-167</td>
<td>(4 \times 10^{1})</td>
<td>(4 \times 10^{1})</td>
</tr>
<tr>
<td>Tm-170</td>
<td>(3 \times 10^{1})</td>
<td>(6 \times 10^{-1})</td>
</tr>
<tr>
<td>Tm-171</td>
<td>(4 \times 10^{1})</td>
<td>(4 \times 10^{1})</td>
</tr>
<tr>
<td>Uranium (92)</td>
<td>(4 \times 10^{1})</td>
<td>(1 \times 10^{-1})</td>
</tr>
<tr>
<td>U-230 (fast lung absorption) (a) (d)</td>
<td>(4 \times 10^{1})</td>
<td>(4 \times 10^{1})</td>
</tr>
<tr>
<td>U-230 (medium lung absorption) (a) (e)</td>
<td>(3 \times 10^{1})</td>
<td>(3 \times 10^{-3})</td>
</tr>
<tr>
<td>U-232 (fast lung absorption) (a) (f)</td>
<td>(4 \times 10^{1})</td>
<td>(1 \times 10^{-2})</td>
</tr>
<tr>
<td>U-232 (medium lung absorption) (e)</td>
<td>(4 \times 10^{1})</td>
<td>(7 \times 10^{-3})</td>
</tr>
<tr>
<td>U-233 (slow lung absorption) (f)</td>
<td>(1 \times 10^{1})</td>
<td>(1 \times 10^{-3})</td>
</tr>
<tr>
<td>U-233 (fast lung absorption) (d)</td>
<td>(4 \times 10^{1})</td>
<td>(9 \times 10^{-2})</td>
</tr>
<tr>
<td>U-233 (medium lung absorption) (e)</td>
<td>(4 \times 10^{1})</td>
<td>(2 \times 10^{-2})</td>
</tr>
<tr>
<td>U-233 (slow lung absorption) (f)</td>
<td>(4 \times 10^{1})</td>
<td>(6 \times 10^{-3})</td>
</tr>
<tr>
<td>U-234 (fast lung absorption) (d)</td>
<td>(4 \times 10^{1})</td>
<td>(9 \times 10^{-2})</td>
</tr>
<tr>
<td>U-234 (medium lung absorption) (e)</td>
<td>(4 \times 10^{1})</td>
<td>(2 \times 10^{-2})</td>
</tr>
<tr>
<td>U-234 (slow lung absorption) (f)</td>
<td>(4 \times 10^{1})</td>
<td>(6 \times 10^{-3})</td>
</tr>
<tr>
<td>Element</td>
<td>Isotope</td>
<td>Absorption Types</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Absorption(f)</td>
<td>U-235 (all lung absorption types)(a)(d)(e)(f)</td>
<td>Unlimited</td>
</tr>
<tr>
<td></td>
<td>U-236 (fast lung absorption)(d)</td>
<td>Unlimited</td>
</tr>
<tr>
<td></td>
<td>U-236 (medium lung absorption)(e)</td>
<td>$4 \times 10^{1}$</td>
</tr>
<tr>
<td></td>
<td>U-236 (slow lung absorption)(f)</td>
<td>$4 \times 10^{1}$</td>
</tr>
<tr>
<td></td>
<td>U-238 (all lung absorption types)(d)(e)(f)</td>
<td>Unlimited</td>
</tr>
<tr>
<td></td>
<td>U (natural)</td>
<td>Unlimited</td>
</tr>
<tr>
<td></td>
<td>U (enriched to 20% or less)(g)</td>
<td>Unlimited</td>
</tr>
<tr>
<td></td>
<td>U (depleted)</td>
<td>Unlimited</td>
</tr>
<tr>
<td></td>
<td>V (natural)</td>
<td>$4 \times 10^{-1}$</td>
</tr>
<tr>
<td></td>
<td>V (enriched)</td>
<td>$4 \times 10^{-1}$</td>
</tr>
<tr>
<td>Vanadium (23)</td>
<td>W (natural)</td>
<td>$4 \times 10^{0}$</td>
</tr>
<tr>
<td></td>
<td>W (enriched)</td>
<td>$3 \times 10^{1}$</td>
</tr>
<tr>
<td></td>
<td>W (natural)</td>
<td>$4 \times 10^{1}$</td>
</tr>
<tr>
<td></td>
<td>W (enriched)</td>
<td>$2 \times 10^{0}$</td>
</tr>
<tr>
<td></td>
<td>Xe (natural)</td>
<td>$4 \times 10^{-1}$</td>
</tr>
<tr>
<td></td>
<td>Xe (enriched)</td>
<td>$4 \times 10^{-1}$</td>
</tr>
<tr>
<td>Xenon (54)</td>
<td>Y (natural)</td>
<td>$4 \times 10^{0}$</td>
</tr>
<tr>
<td></td>
<td>Y (enriched)</td>
<td>$4 \times 10^{1}$</td>
</tr>
<tr>
<td>Yttrium (39)</td>
<td>Yb (natural)</td>
<td>$1 \times 10^{0}$</td>
</tr>
<tr>
<td></td>
<td>Yb (enriched)</td>
<td>$4 \times 10^{0}$</td>
</tr>
<tr>
<td>Ytterbium (70)</td>
<td>Yb-169</td>
<td>$3 \times 10^{1}$</td>
</tr>
</tbody>
</table>
Zinc (30)

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Zn-65</td>
<td>$2 \times 10^0$</td>
<td>$2 \times 10^0$</td>
<td>$1 \times 10^1$</td>
<td>$1 \times 10^6$</td>
</tr>
<tr>
<td>Zn-69</td>
<td>$3 \times 10^0$</td>
<td>$6 \times 10^{-1}$</td>
<td>$1 \times 10^4$</td>
<td>$1 \times 10^6$</td>
</tr>
<tr>
<td>Zn-69m (a)</td>
<td>$3 \times 10^0$</td>
<td>$6 \times 10^{-1}$</td>
<td>$1 \times 10^2$</td>
<td>$1 \times 10^9$</td>
</tr>
</tbody>
</table>

Zirconium (40)

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Zr-88</td>
<td>$3 \times 10^0$</td>
<td>$3 \times 10^0$</td>
<td>$1 \times 10^2$</td>
<td>$1 \times 10^6$</td>
</tr>
<tr>
<td>Zr-93</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>$1 \times 10^4$ (b)</td>
<td>$1 \times 10^7$ (b)</td>
</tr>
<tr>
<td>Zr-95 (a)</td>
<td>$2 \times 10^0$</td>
<td>$8 \times 10^{-1}$</td>
<td>$1 \times 10^1$</td>
<td>$1 \times 10^6$</td>
</tr>
<tr>
<td>Zr-97 (a)</td>
<td>$4 \times 10^{-1}$</td>
<td>$4 \times 10^{-1}$</td>
<td>$1 \times 10^1$ (b)</td>
<td>$1 \times 10^5$ (b)</td>
</tr>
</tbody>
</table>

(a) $A_1$ and/or $A_2$ values for these parent radionuclides include contributions from their progeny with half-lives less than 10 days, as listed in the following:

- Mg-28
- Al-28
- Ar-42
- K-42
- Ca-47
- Sc-47
- Ti-44
- Sc-44
- Fe-52
- Mn-52m
- Fe-60
- Co-60m
- Zn-69m
- Zn-69
- Ge-68
- Ga-68
- Rb-83
- Kr-83m
- Sr-82
- Rb-82
- Sr-90
- Y-90
- Sr-91
- Y-91m
- Sr-92
- Y-92
- Y-87
- Sr-87m
- Zr-95
- Nb-95m
- Zr-97
- Nb-97m, Nb-97
- Mo-99
- Tc-99m
- Tc-95m
- Tc-96m
- Ru-103
- Rh-103m
- Ru-106
- Rh-106
- Pd-103
- Rh-103m
- Ag-108m
- Ag-108
- Ag-110m
- Ag-110
- Cd-115
- In-115m
- In-114m
- In-114
- Sn-113
- In-113m
- Sn-121m
- Sn-121
- Sn-126
- Sb-126m
- Te-118
- Sb-118
- Te-127m
- Te-127
- Te-129m
- Te-129
- Te-131m
- Te-131
- Te-132
- I-132
I-135  Xe-135m
Xe-122  I-122
Cs-137  Ba-137m
Ba-131  Cs-131
Ba-140  La-140
Ce-144  Pr-144m, Pr-144
Pm-148m Pm-148
Gd-146  Eu-146
Dy-166  Ho-166
Hf-172  Lu-172
W-178  Ta-178
W-188  Re-188
Re-189  Os-189m
Os-194  Ir-194
Ir-189  Os-189m
Pt-188  Ir-188
Hg-194  Au-194
Hg-195m Hg-195
Pb-210  Bi-210
Pb-212  Bi-212, Tl-208, Po-212
Bi-210m Tl-206
Bi-212  Tl-208, Po-212
At-211  Po-211
Rn-222  Po-218, Pb-214, At-218, Bi-214, Po-214
Ra-223  Rn-219, Po-215, Pb-211, Bi-211, Po-211, Tl-207
Ra-224  Rn-220, Po-216, Pb-212, Bi-212, Tl-208, Po-212
Ra-225  Ac-225, Fr-221, At-217, Bi-213, Tl-209, Po-213, Pb-209
Ra-226  Rn-222, Po-218, Pb-214, At-218, Bi-214, Po-214
Ra-228  Ac-228
Ac-225  Fr-221, At-217, Bi-213, Tl-209, Po-213, Pb-209
Ac-227  Fr-223
Th-228  Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208, Po-212
Th-234  Pa-234m, Pa-234
Pa-230  Ac-226, Th-226, Fr-222, Ra-222, Rn-218, Po-214
U-230  Th-226, Ra-222, Rn-218, Po-214
U-235  Th-231
Pu-241  U-237
Pu-244  U-240, Np-240m
Am-242m Am-242, Np-243
Am-243  Np-239
Cm-247  Pu-243
Bk-249  Am-245
Cf-253  Cm-249

(b) Parent nuclides and their progeny included in secular equilibrium are listed in the following:
Sr-90  Y-90
Zr-93  Nb-93m  
Zr-97  Nb-97  
Ru-106  Rh-106  
Ag-108m  Ag-108  
Cs-137 Ba-137m  
Ce-144Pr-144  
Ba-140La-140  
Bi-212 Tl-208 (0.36), Po-212 (0.64)  
Pb-210Bi-210, Po-210  
Pb-212Bi-212, Tl-208 (0.36), Po-212 (0.64)  
Ru-222  Po-218, Pb-214, Bi-214, Po-214  
Ra-223Rn-219, Po-215, Pb-211, Bi-211, Tl-207  
Ra-226Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)  
Ra-228Ac-228  
Th-228Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)  
Th-229Ra-225, Ac-225, Fr-221, At-217, Bi-213, Po-213, Pb-209  
Th-natural  Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)  
Th-234Pa-234m  
U-230  Th-226, Ra-222, Rn-218, Po-214  
U-232  Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)  
U-235  Th-231  
U-238  Th-234, Pa-234m  
U-natural Th-234, Pa-234m, U-234, Th-230, Ra-226, Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210  
Np-237  Pa-233  
Am-242m  Am-242  
Am-243  Np-239  

c) The quantity may be determined from a measurement of the rate of decay or a measurement of the radiation level at a prescribed distance from the source;  
(d) These values apply only to compounds of uranium that take the chemical form of UF6, UO2F2 and UO2(NO3)2 in both normal and accident conditions of transport;  
(e) These values apply only to compounds of uranium that take the chemical form of UO3, UF4, UC14 and hexavalent compounds in both normal and accident conditions of transport;  
(f) These values apply to all compounds of uranium other than those specified in (d) and (e) above;  
(g) These values apply to unirradiated uranium only;  
(h) The competent authority may determine and approve alternative activity limits for an exempt consignment of instruments and articles. Alternative value is subject to multilateral approval.  

405. For mixtures of radionuclides, the basic radionuclide values referred to in para. 402 may be determined as follows:  

\[ X_m = \frac{1}{\sum_i f(i) X(i)} \]
\[ f(i) \text{ is the fraction of activity or activity concentration of radionuclide } i \text{ in the mixture.} \]
\[ X(i) \text{ is the appropriate value of } A_1 \text{ or } A_2, \text{ or the activity concentration limit for exempt material or the activity limit for an exempt } \textit{consignment} \text{ as appropriate for the radionuclide } i. \]
\[ X_m \text{ is the derived value of } A_1 \text{ or } A_2, \text{ or the activity concentration limit for exempt material or the activity limit for an exempt } \textit{consignment} \text{ in the case of a mixture.} \]

406. When the identity of each radionuclide is known but the individual activities of some of the radionuclides are not known, the radionuclides may be grouped and the lowest radionuclide value, as appropriate, for the radionuclides in each group may be used in applying the formulas in paras 405 and 430. Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest radionuclide values for the alpha emitters or beta/gamma emitters, respectively.

**TABLE 3. BASIC RADIONUCLIDE VALUES FOR UNKNOWN radionuclides or mixtures**

<table>
<thead>
<tr>
<th>Radioactive content</th>
<th>( A_1 ) (TBq)</th>
<th>( A_2 ) (TBq)</th>
<th>Activity concentration limit for exempt material (Bq/g)</th>
<th>Activity limit for an exempt consignment (Bq)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only beta or gamma emitting nuclides are known to be present</td>
<td>0.1</td>
<td>0.02</td>
<td>( 1 \times 10^1 )</td>
<td>( 1 \times 10^4 )</td>
</tr>
<tr>
<td>Alpha emitting nuclides, but no neutron emitters are known to be present</td>
<td>0.2</td>
<td>( 9 \times 10^5 )</td>
<td>( 1 \times 10^{-1} )</td>
<td>( 1 \times 10^3 )</td>
</tr>
<tr>
<td>Neutron emitting nuclides are known to be present or no relevant data are available</td>
<td>0.001</td>
<td>( 9 \times 10^5 )</td>
<td>( 1 \times 10^{-1} )</td>
<td>( 1 \times 10^3 )</td>
</tr>
</tbody>
</table>

407. For individual radionuclides or for mixtures of radionuclides for which relevant data are not available, the values shown in Table 3 shall be used.

(eeee) **CLASSIFICATION OF MATERIAL**

**Low specific activity (LSA) material**

408. *Radioactive material* may only be classified as *LSA material* if the conditions of paras 226, 409–411 and 517–522 are met.

409. *LSA material* shall be in one of three groups:

(a) *LSA-I*:

(iv) *Uranium* and thorium ores and concentrates of such ores, and other ores containing naturally occurring radionuclides;

(v) *Natural uranium, depleted uranium*, natural thorium or their compounds or mixtures, that are unirradiated and in solid or liquid form;

(vi) *Radioactive material* for which the \( A_2 \) value is unlimited. *Fissile material* may be included only if excepted under para. 417;

(iv) Other *radioactive material* in which the activity is distributed throughout and the estimated average *specific activity* does not exceed 30 times the values for activity
concentration specified in paras 402–407. **Fissile material** may be included only if excepted under para. 417.

(b) **LSA-II:**
(i) Water with a tritium concentration of up to 0.8 TBq/L;
(ii) Other material in which the activity is distributed throughout and the estimated average specific activity does not exceed $10^{-4} A_2/\text{g}$ for solids and gases, and $10^{-5} A_2/\text{g}$ for liquids.

(c) **LSA-III:**
Solids (e.g. consolidated wastes, activated materials), excluding powders, that meet the requirements of para. 601, in which:

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

(ii) The radioactive material is relatively insoluble, or it is intrinsically contained in a relatively insoluble matrix, so that, even under loss of packaging, the loss of radioactive material per package by leaching when placed in water for seven days would not exceed $0.1 A_2$.

(iii) The estimated average specific activity of the solid, excluding any shielding material, does not exceed $2 \times 10^{-3} A_2/\text{g}$.

410. A single package of non-combustible solid LSA-II or LSA-III material, if carried by air, shall not contain an activity greater than 3000 $A_2$.

411. The radioactive contents in a single package of LSA material shall be so restricted that the radiation level specified in para. 517 shall not be exceeded, and the activity in a single package shall also be so restricted that the activity limits for a conveyance specified in para. 522 shall not be exceeded.

**Surface contaminated object (SCO)**

412. **Radioactive material** may be classified as SCO if the conditions of paras 241, 413, 414 and 517–522 are met.

413. **SCO** shall be in one of two groups:
(a) **SCO-I:** A solid object on which:
(i) The non-fixed contamination on the accessible surface averaged over 300 cm$^2$ (or the area of the surface if less than 300 cm$^2$) does not exceed 4 Bq/cm$^2$ for beta and gamma emitters and low toxicity alpha emitters, or 0.4 Bq/cm$^2$ for all other alpha emitters.

(ii) The fixed contamination on the accessible surface averaged over 300 cm$^2$ (or the area of the surface if less than 300 cm$^2$) does not exceed $4000 \times 10^4$ Bq/cm$^2$ for beta and gamma emitters and low toxicity alpha emitters, or $4000$ Bq/cm$^2$ for all other alpha emitters.

(iii) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm$^2$ (or the area of the surface if less than 300 cm$^2$) does not exceed $4000 \times 10^4$ Bq/cm$^2$ for beta and gamma emitters and low toxicity alpha emitters, or $4000$ Bq/cm$^2$ for all other alpha emitters.

(b) **SCO-II:** A solid object on which either the fixed or non-fixed contamination on the surface exceeds the applicable limits specified for SCO-I in (a) above and on which:
(i) The non-fixed contamination on the accessible surface averaged over 300 cm$^2$ (or the area of the surface if less than 300 cm$^2$) does not exceed 400 Bq/cm$^2$ for beta and gamma emitters and low toxicity alpha emitters, or 40 Bq/cm$^2$ for all other alpha emitters.
(ii) The fixed contamination on the accessible surface, averaged over 300 cm$^2$ (or the area of the surface if less than 300 cm$^2$) does not exceed $8 \times 10^5$ Bq/cm$^2$ for beta and gamma emitters and low toxicity alpha emitters, or $8 \times 10^4$ Bq/cm$^2$ for all other alpha emitters.
(iii) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm$^2$ (or the area of the surface if less than 300 cm$^2$) does not exceed $8 \times 10^5$ Bq/cm$^2$ for beta and gamma emitters and low toxicity alpha emitters, or $8 \times 10^4$ Bq/cm$^2$ for all other alpha emitters.

414. The radioactive contents in a single package of SCO shall be so restricted that the radiation level specified in para. 517 shall not be exceeded, and the activity in a single package shall also be so restricted that the activity limits for a conveyance specified in para. 522 shall not be exceeded.

Special form radioactive material
415. Radioactive material may be classified as special form radioactive material only if it meets the requirements of paras 602-604 and 802.

Low dispersible radioactive material
416. Radioactive material may be classified as low dispersible radioactive material only if it meets the requirements of para. 605 taking into account the requirements of paras 665 and 802.

Fissile material
417. Fissile material and packages containing fissile material shall be classified under the relevant entry as FISSILE in accordance with Table 1 unless excepted by one of the provisions of subparas (a)–(f) of this paragraph and transported subject to the requirements of para 570. All provisions apply only to material in packages that meets the requirements of para. 636 unless unpackaged material is specifically allowed in the provision.

(a) Uranium enriched in uranium-235 to a maximum of 1% by mass, and with a total plutonium and uranium-233 content not exceeding 1% of the mass of uranium-235, provided that the fissile nuclides are distributed essentially homogeneously throughout the material. In addition, if uranium-235 is present in metallic, oxide or carbide forms, it shall not form a lattice arrangement;
(b) Liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2% by mass, with a total plutonium and uranium-233 content not exceeding 0.002% of the mass of uranium, and with a minimum nitrogen to uranium atomic ratio (N/U) of 2;
(c) Uranium with a maximum uranium enrichment of 5% by mass uranium-235 provided:
   (i) There is no more than 3.5 g of uranium-235 per package.
   (ii) The total plutonium and uranium-233 content does not exceed 1% of the mass of uranium-235 per package.
   (iii) Transport of the package is subject to the consignment limit provided in para 570 (c).
   (d) Fissile nuclides with a total mass not greater than 2.0 g per package provided the package is transported subject to the consignment limit provided in para. 570(d).
(e) *Fissile nuclides* with a total mass not greater than 45 g either packaged or unpackaged subject to limits provided in para 570 (e).
(f) A *fissile material* that meets the requirements of paras 570 (b), 606 and 802.

418. The contents of *packages* containing *fissile material* shall be as specified for the *package design* either directly in these Regulations or in the certificate of approval, in accordance with the applicable paras 417(a)-(f), 674, 675 or 816.

**Uranium hexafluoride**

419. Uranium hexafluoride shall be assigned to one of the following UN numbers only:
(a) UN 2977, RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, FISSILE;
(b) UN 2978, RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, non-fissile or fissile-excepted;
(c) UN 3XXX RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - URANIUM HEXAFLUORIDE, less than 0.1 kg per *package*, non-fissile or fissile-excepted, in the case of uranium hexafluoride in quantities of less than 0.1 kg in an *excepted package*.

420. The contents of a *package* containing uranium hexafluoride shall comply with the following requirements:
(a) The mass of uranium hexafluoride shall not be different from that allowed for the *package design*;
(b) The mass of uranium hexafluoride shall not be greater than a value that would lead to an ullage of less than 5% at the maximum temperature of the *package* as specified for the plant systems where the *package* might be used;
(c) The uranium hexafluoride shall be in solid form and the internal pressure shall not be above atmospheric pressure when presented for transport.

**CLASSIFICATION OF PACKAGES**

421. The quantity of *radioactive material* in a *package* shall not exceed the relevant limits for the *package* type as specified below.

**Classification as excepted package**

422. A *package* may be classified as an *excepted package* if it meets one of the following conditions:
(a) It is an empty *package* having contained *radioactive material*;
(b) It contains instruments or articles not exceeding the activity limits specified in Table 4;
(c) It contains articles manufactured of natural *uranium*, *depleted uranium* or natural thorium;
(d) It contains *radioactive material* not exceeding the activity limits specified in Table 4;
(e) It contains less than 0.1 kg of uranium hexafluoride not exceeding the activity limits specified in column 4 of Table 4.

**TABLE 4. ACTIVITY LIMITS FOR EXCEPTED PACKAGES**

<table>
<thead>
<tr>
<th>Physical state of contents</th>
<th>Instrument or article</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item limits a</td>
<td><em>Package limits</em> a</td>
<td><em>Package limits</em> a</td>
</tr>
</tbody>
</table>

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Solids:

Special form \(10^{-2} A_1\) \(A_1\) \(10^{-3} A_1\)

Other forms \(10^{-2} A_2\) \(A_2\) \(10^{-3} A_2\)

Liquids

\(10^{-3} A_2\) \(10^{-1} A_2\) \(10^{-4} A_2\)

Gases:

Tritium \(2 \times 10^{-2} A_2\) \(2 \times 10^{-1} A_2\) \(2 \times 10^{-2} A_2\)

Special form \(10^{-3} A_1\) \(10^{-2} A_1\) \(10^{-3} A_1\)

Other forms \(10^{-3} A_2\) \(10^{-2} A_2\) \(10^{-3} A_2\)

---

\(^a\) For mixtures of radionuclides, see paras 405–407.

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

(a) The radiation level at 10 cm from any point on the external surface of any unpackaged instrument or article is not greater than 0.1 mSv/h;
(b) Each instrument or article bears the marking “RADIOACTIVE” on its external surface except for the following:
   (i) Radioluminescent time-pieces or devices do not require markings.
   (ii) Consumer products that have either received regulatory approval in accordance with para. 107(e) or do not individually exceed the activity limit for an exempt consignment in Table 2 (column 5) do not require markings, provided that such products are transported in a package that bears the marking “RADIOACTIVE” on its internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package.
   (iii) Other instruments or articles too small to bear the marking “RADIOACTIVE” do not require markings, provided that they are transported in a package that bears the marking “RADIOACTIVE” on its internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package.
(c) The active material is completely enclosed by non-active components (a device performing the sole function of containing radioactive material shall not be considered to be an instrument or manufactured article);
(d) The limits specified in columns 2 and 3 of Table 4 are met for each individual item and each package, respectively;
(e) For transport by post, the total activity in each excepted package shall not exceed one tenth of the relevant limits specified in column 3 of Table 4.

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424. **Radioactive material** in forms other than as specified in para. 423 and with an activity not exceeding the limits specified in column 4 of Table 4 may be classified under UN 2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – LIMITED QUANTITY OF MATERIAL, provided that:

(a) The package retains its radioactive contents under routine conditions of transport;
(b) The package bears the marking “RADIOACTIVE” on either:
   (i) An internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package; or
   (ii) The outside of the package, where it is impractical to mark an internal surface.
(c) For transport by post, the total activity in each excepted package shall not exceed one tenth of the relevant limits specified in column 4 of Table 4.

425. Uranium hexafluoride not exceeding the limits specified in column 4 of Table 4 may be classified under UN 3XXX RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - URANIUM HEXAFLUORIDE, less than 0.1 kg per package, non-fissile or fissile-excepted, provided that:

(a) The mass of uranium hexafluoride in the package is less than 0.1 kg.
(b) The conditions of paras 420 and 424 (a), (b) are met.
(c) For transport by post, the mass of uranium hexafluoride in the package shall be less than 10 g.

426. Articles manufactured of natural uranium, depleted uranium or natural thorium and articles in which the sole radioactive material is unirradiated natural uranium, unirradiated depleted uranium or unirradiated natural thorium may be classified under UN 2909, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – ARTICLES MANUFACTURED FROM NATURAL URANIUM or DEPLETED URANIUM or NATURAL THORIUM, provided that the outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or some other substantial material.

**Additional requirements and controls for transport of empty packagings**

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

(a) It is in a well-maintained condition and securely closed.
(b) The outer surface of any uranium or thorium in its structure is covered with an inactive sheath made of metal or some other substantial material.
(c) The level of internal non-fixed contamination does not exceed 100 times the levels specified in para. 508.
(d) Any labels that may have been displayed on it in conformity with para. 538 are no longer visible.

**Classification as Type A package**

428. Packages containing radioactive material may be classified as Type A packages provided that the conditions of paras 429 and 430 are met.

429. Type A packages shall not contain activities greater than either of the following:

(a) For special form radioactive material — A1;
(b) For all other radioactive material — A2.

430. For mixtures of radionuclides whose identities and respective activities are known, the following condition shall apply to the radioactive contents of a Type A package:
\[
\sum_{i} \frac{B(i)}{A_1(i)} + \sum_{j} \frac{C(j)}{A_2(j)} \leq 1
\]

where
- \(B(i)\) is the activity of radionuclide i as special form radioactive material.
- \(A_1(i)\) is the \(A_1\) value for radionuclide i.
- \(C(j)\) is the activity of radionuclide j as other than special form radioactive material.
- \(A_2(j)\) is the \(A_2\) value for radionuclide j.

**Classification as Type B(U), Type B(M) or Type C package**

431. *Type B(U), Type B(M) and Type C packages* shall be classified in accordance with the **competent authority certificate of approval for the package** issued by the country of origin of design.

432. The contents of a *Type B(U), Type B (M) or Type C package* shall be as specified in the certificate of approval.

433. *Type B(U) and Type B(M) packages*, if transported by air, shall meet the requirements of para. 432 and shall not contain activities greater than the following:
   
   (a) For low dispersible radioactive material — as authorized for the *package design* as specified in the certificate of approval;
   
   (b) For special form radioactive material — \(3000 A_1\) or \(10^5 A_2\), whichever is the lower;
   
   (c) For all other radioactive material — \(3000 A_2\).

434. *Radioactive material* shall be classified as transported under *special arrangement* when it is intended to be carried in accordance with para. 310.

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**SPECIAL ARRANGEMENT**

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119
(hhhh) Section V
(iii) REQUIREMENTS AND CONTROLS FOR TRANSPORT
(jjjj) REQUIREMENTS BEFORE THE FIRST SHIPMENT

501. Before a packaging is first used to transport radioactive material, it shall be confirmed that it has been manufactured in conformity with the design specifications to ensure compliance with the relevant provisions of these Regulations and any applicable certificate of approval. The following requirements shall also be fulfilled, if applicable:
(a) If the design pressure of the containment system exceeds 35 kPa (gauge), it shall be ensured that the containment system of each packaging conforms to the approved design requirements relating to the capability of that system to maintain its integrity under that pressure.
(b) For each packaging intended for use as a Type B(U), Type B(M) or Type C package and for each packaging intended to contain fissile material, it shall be ensured that the effectiveness of its shielding and containment and, where necessary, the heat transfer characteristics and the effectiveness of the confinement system, are within the limits applicable to or specified for the approved design.
(c) For each packaging intended to contain fissile material, it shall be ensured that the effectiveness of the criticality safety features is within the limits applicable to or specified for the design, and in particular where, in order to comply with the requirements of para. 673, neutron poisons are specifically included, checks shall be performed to confirm the presence and distribution of those neutron poisons.

(kkkk) REQUIREMENTS BEFORE EACH SHIPMENT

502. Before each shipment of any package, it shall be ensured that the package contains neither:
(a) Radionuclides different from those assessed specified for the package design; nor
(b) Contents in a form, or physical or chemical state different from those assessed specified for the package design.

503. Before each shipment of any package, it shall be ensured that all the requirements specified in the relevant provisions of these Regulations and in the applicable certificates of approval have been fulfilled. The following requirements shall also be fulfilled, if applicable:
(a) It shall be ensured that lifting attachments that do not meet the requirements of para. 608 have been removed or otherwise rendered incapable of being used for lifting the package, in accordance with para. 609.
(b) Each Type B(U), Type B(M) and Type C package shall be held until equilibrium conditions have been approached closely enough to demonstrate compliance with the requirements for temperature and pressure unless an exemption from these requirements has received unilateral approval.
(c) For each Type B(U), Type B(M) and Type C package, it shall be ensured by inspection and/or appropriate tests that all closures, valve and other openings of the containment system through which the radioactive contents might escape are properly closed and, where appropriate, sealed in the manner for which the demonstrations of compliance with the requirements of paras 659 and 671 were made.
(d) For packages containing fissile material the measurement specified in para. 677(b) and the tests to demonstrate closure of each package as specified in para. 680 shall be performed.
(III) TRANSPORT OF OTHER GOODS

504. A package shall not contain any items other than those that are necessary for the use of the radioactive material. The interaction between these items and the package, under the conditions of transport applicable to the design, shall not reduce the safety of the package.

505. Freight containers, IBCs, overpacks and tanks, as well as other packagings and overpacks, used for the transport of radioactive material shall not be used for the storage or transport of other goods unless decontaminated below the level of 0.4 Bq/cm\(^2\) for beta and gamma emitters and low toxicity alpha emitters and 0.04 Bq/cm\(^2\) for all other alpha emitters.

506. Consignments shall be segregated from other dangerous goods during transport in compliance with the relevant transport regulations for dangerous goods of each of the countries through or into which the materials will be transported, and, where applicable, with the regulations of the cognizant transport organizations, as well as these Regulations.

()&&(mmmm) OTHER DANGEROUS PROPERTIES OF CONTENTS

507. In addition to the radioactive and fissile properties, any other dangerous properties of the contents of the package, such as explosiveness, flammability, pyrophoricity, chemical toxicity and corrosiveness, shall be taken into account in the packing, labelling, marking, placarding, storage and transport in order to be in compliance with the relevant transport regulations for dangerous goods of each of the countries through or into which the materials will be transported, and, where applicable, with the regulations of the cognizant transport organizations, as well as these Regulations.

()&&(nnnn) REQUIREMENTS AND CONTROLS FOR CONTAMINATION AND FOR LEAKING PACKAGES

508. The non-fixed contamination on the external surfaces of any package shall be kept as low as practicable and, under routine conditions of transport, shall not exceed the following limits:
   (a) 4 Bq/cm\(^2\) for beta and gamma emitters and low toxicity alpha emitters;
   (b) 0.4 Bq/cm\(^2\) for all other alpha emitters.

These limits are applicable when averaged over any area of 300 cm\(^2\) of any part of the surface.

509. Except as provided in para. 514, the level of non-fixed contamination on the external and internal surfaces of overpacks, freight containers, tanks, IBCs and conveyances shall not exceed the limits specified in para. 508.

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

511. Packages that are damaged or leaking radioactive contents in excess of allowable limits for normal conditions of transport may be removed to an acceptable interim
location under supervision, but shall not be forwarded until repaired or reconditioned and decontaminated.

512. A conveyance and equipment used regularly for the transport of radioactive material shall be periodically checked to determine the level of contamination. The frequency of such checks shall be related to the likelihood of contamination and the extent to which radioactive material is transported.

513. Except as provided in para. 514, any conveyance, or equipment or part thereof that has become contaminated above the limits specified in para. 508 in the course of the transport of radioactive material, or that shows a radiation level in excess of 5 μSv/h at the surface, shall be decontaminated as soon as possible by a qualified person and shall not be reused unless the following conditions are fulfilled:

(a) The non-fixed contamination shall not exceed the limits specified in para. 508;
(b) The radiation level resulting from the fixed contamination shall not exceed 5 μSv/h at the surface.

514. A freight container, tank, IBC or conveyance dedicated to the transport of unpackaged radioactive material under exclusive use shall be excepted from the requirements of paras 509 and 513 solely with regard to its internal surfaces and only for as long as it remains under that specific exclusive use.

515. Excepted packages shall be subject only to the following provisions in Sections V and VI:

(a) The requirements specified in paras 503 504, 505, 507–513, 516, 530-533, 545, 546 introductory sentence, 546 (a), (j) and (k), 550–553, 555, 556, 561, 564, 582 and 583;
(b) The requirements for excepted packages specified in para. 622;
(c) If the excepted package contains fissile material, one of the fissile exceptions provided by para. 417 shall apply. This implies that also para. 636 shall be complied with;
(d) The requirements specified in paras 580 and 581, if transported by post.

All relevant provisions of the other sections shall apply to excepted packages. If the excepted package contains fissile material, para. 417 shall apply.

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

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

518. For LSA material and SCO that are or contain fissile material, that is not excepted under para. 417, the applicable requirements of paras 568 and 569 shall be met.
For LSA material and SCO that are or contain fissile material, that is not excepted under para. 417, and that do not meet the requirements of paras 674 and 675, the applicable requirements of para. 673 shall be met.

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

(a) All unpackaged material other than ores containing only naturally occurring radionuclides shall be transported in such a manner that under routine conditions of transport there will be no escape of the radioactive contents from the conveyance nor will there be any loss of shielding.

(b) Each conveyance shall be under exclusive use, except when only transporting SCO-I on which the contamination on the accessible and the inaccessible surfaces is not greater than 10 times the applicable level specified in para. 214.

(c) For SCO-I where it is suspected that non-fixed contamination exists on inaccessible surfaces in excess of the values specified in para. 413(a)(i), measures shall be taken to ensure that the radioactive material is not released into the conveyance.

(d) Unpackaged fissile material shall meet the requirement of para 417 (e).

**TABLE 5. INDUSTRIAL PACKAGE REQUIREMENTS FOR LSA MATERIAL AND SCO**

<table>
<thead>
<tr>
<th>Radioactive contents</th>
<th>Industrial package type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exclusive use</td>
</tr>
<tr>
<td><strong>LSA-I</strong></td>
<td></td>
</tr>
<tr>
<td>Solid</td>
<td>Type IP-1</td>
</tr>
<tr>
<td>Liquid</td>
<td>Type IP-1</td>
</tr>
<tr>
<td><strong>LSA-II</strong></td>
<td></td>
</tr>
<tr>
<td>Solid</td>
<td>Type IP-2</td>
</tr>
<tr>
<td>Liquid and gas</td>
<td>Type IP-2</td>
</tr>
<tr>
<td><strong>LSA-III</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type IP-2</td>
</tr>
<tr>
<td><strong>SCO-I</strong></td>
<td>Type IP-1</td>
</tr>
<tr>
<td><strong>SCO-II</strong></td>
<td>Type IP-2</td>
</tr>
</tbody>
</table>

*Under the conditions specified in para. 520, LSA-I material and SCO-I may be transported unpackaged.*

LSA material and SCO, except as otherwise specified in para. 520, shall be packaged in accordance with Table 5.

The total activity in a single hold or compartment of an inland waterway craft, or in another conveyance, for carriage of LSA material or SCO in a Type IP-1, Type IP-2, Type IP-3 package or unpackaged, shall not exceed the limits shown in Table 6.

**DETERMINATION OF TRANSPORT INDEX**

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

(i) 0.4 mSv/h for ores and physical concentrates of uranium and thorium;
(ii) 0.3 mSv/h for chemical concentrates of thorium;
(iii) 0.02 mSv/h for chemical concentrates of uranium, other than uranium hexafluoride;

(b) For tanks, freight containers and unpackaged LSA-I and SCO-I, the value determined in step (a) shall be multiplied by the appropriate factor from Table 7.

(c) The value obtained in steps (a) and (b) shall be rounded up to the first decimal place (e.g. 1.13 becomes 1.2), except that a value of 0.05 or less may be considered as zero.

TABLE 6. CONVEYANCE ACTIVITY LIMITS FOR LSA MATERIAL AND SCO IN INDUSTRIAL PACKAGES OR UNPACKAGED

<table>
<thead>
<tr>
<th>Nature of material</th>
<th>Activity limit for conveyances other than inland waterway craft</th>
<th>Activity limit for a hold or compartment of an inland waterway craft</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSA-I</td>
<td>No limit</td>
<td>No limit</td>
</tr>
<tr>
<td>LSA-II and LSA-III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>non-combustible solids</td>
<td>No limit</td>
<td>100A₂</td>
</tr>
<tr>
<td>LSA-II and LSA-III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>combustible solids, and all liquids and gases</td>
<td>100A₂</td>
<td>10A₂</td>
</tr>
<tr>
<td>SCO</td>
<td>100A₂</td>
<td>10A₂</td>
</tr>
</tbody>
</table>

524. The TI for each overpack, freight container or conveyance shall be determined as either the sum of the TIs of all the packages contained, or by direct measurement of radiation level, except in the case of non-rigid overpacks, for which the TI shall be determined only as the sum of the TIs of all the packages.

TABLE 7. Multiplication factors for TANKS, FREIGHT CONTAINERS, AND UNPACKAGED LSA-I AND SCO-I

<table>
<thead>
<tr>
<th>Size of loadᵃ</th>
<th>Multiplication factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>size of load &lt; 1 m²</td>
<td>1</td>
</tr>
<tr>
<td>1 m² &lt; size of load &lt; 5 m²</td>
<td>2</td>
</tr>
<tr>
<td>5 m² &lt; size of load &lt; 20 m²</td>
<td>3</td>
</tr>
<tr>
<td>20 m² &lt; size of load</td>
<td>10</td>
</tr>
</tbody>
</table>

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

DETERMINATION OF CRITICALITY SAFETY INDEX FOR CONSIGNMENTS, FREIGHT CONTAINERS AND OVERPACKS
The CSI for each overpack or freight container shall be determined as the sum of the CSIs of all the packages contained. The same procedure shall be followed for determining the total sum of the CSIs in a consignment or aboard a conveyance.

LIMITS ON TRANSPORT INDEX, CRITICALITY SAFETY INDEX AND RADIATION LEVELS FOR PACKAGES AND OVERPACKS

Except for consignments under exclusive use, the TI of any package or overpack shall not exceed 10, nor shall the CSI of any package or overpack exceed 50.

Exception for packages or overpacks transported under exclusive use by rail or by road under the conditions specified in para. 573(a), or under exclusive use and special arrangement by vessel or by air under the conditions specified in paras 575 or 579, respectively, the maximum radiation level at any point on the external surface of a package or overpack shall not exceed 2 mSv/h.

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

CATEGORIES

Packages, overpacks and freight containers shall be assigned to either category I-WHITE, II-YELLOW or III-YELLOW in accordance with the conditions specified in Table 8 and with the following requirements:

(a) For a package, overpack or freight container, the TI and the surface radiation level conditions shall be taken into account in determining which category is appropriate. Where the TI satisfies the condition for one category but the surface radiation level satisfies the condition for a different category, the package, overpack or freight container shall be assigned to the higher category. For this purpose, category I-WHITE shall be regarded as the lowest category.

(b) The TI shall be determined following the procedures specified in paras 523 and 524.

(c) If the surface radiation level is greater than 2 mSv/h, the package or overpack shall be transported under exclusive use and under the provisions of paras 573(a), 575 or 579, as appropriate.

(d) A package transported under a special arrangement shall be assigned to category III-YELLOW except under the provisions of para. 530.

(e) An overpack or freight container that contains packages transported under special arrangement shall be assigned to category III-YELLOW except under the provisions of para. 530.

TABLE 8. CATEGORIES OF PACKAGES, OVERPACKS AND FREIGHT CONTAINERS

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Maximum radiation level at any point on external surface</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>TI 0⁰</td>
<td>Not more than 0.005 mSv/h</td>
<td>I-White</td>
</tr>
<tr>
<td>More than 0 but not more than 1⁰</td>
<td>More than 0.005 mSv/h but not more than 0.5 mSv/h</td>
<td>II-Yellow</td>
</tr>
<tr>
<td>More than 1 but not more than 10</td>
<td>More than 0.5 mSv/h but not more than 2 mSv/h</td>
<td>III-Yellow</td>
</tr>
<tr>
<td>More than 10</td>
<td>More than 2 mSv/h but not more than 2 mSv/h</td>
<td>III-Yellow b</td>
</tr>
</tbody>
</table>

b. Exception for packages or overpacks transported under exclusive use by rail or by road under the conditions specified in para. 573(a), or under exclusive use and special arrangement by vessel or by air under the conditions specified in paras 575 or 579, respectively.
than 10 mSv/h

\[a\] If the measured TI is not greater than 0.05, the value quoted may be zero in accordance with para. 523(c).

\[b\] Shall also be transported under exclusive use except for freight containers, see Table 10.

**MARKING, LABELLING AND PLACARDING**

530. For each *package* or *overpack* the UN number and proper shipping name shall be determined (see Table 1). In all cases of international transport of *packages* requiring *competent authority* approval of *design* or *shipment*, for which different approval types apply in the different countries concerned by the *shipment*, the UN number, proper shipping name, categorization, labelling and marking shall be in accordance with the certificate of the country of origin of *design*.

**Marking**

531. Each *package* shall be legibly and durably marked on the outside of the *packaging* with an identification of either the *consignor* or *consignee*, or both. Each *Overpack* shall be legibly and durably marked on the outside of the *overpack* with an identification of either the *consignor* or *consignee*, or both unless these markings of all the *packages* within the *Overpack* are clearly visible.

532. Each *package* shall be legibly and durably marked on the outside with the UN marking as specified in Table 9. Additionally, each *overpack* shall be legibly and durably marked with the word “OVERPACK” and the UN marking as specified in Table 9 unless all markings of the *packages* within the *Overpack* are clearly visible.
TABLE 9. UN MARKING FOR PACKAGES AND OVERPACKS

<table>
<thead>
<tr>
<th>Item</th>
<th>UN markinga</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package (other than an excepted package)</td>
<td>UN number, preceded by the letters “UN”, and the proper shipping name</td>
</tr>
<tr>
<td>Excepted package (other than those in consignments accepted for international movement by post)</td>
<td>UN number, preceded by the letters “UN”</td>
</tr>
<tr>
<td>Overpack (other than an overpack containing only excepted packages)</td>
<td>UN number, preceded by the letters “UN” for each applicable UN number in the overpack, followed by the proper shipping name in the case of a non-excepted package</td>
</tr>
<tr>
<td>Overpack containing only excepted packages (other than consignments accepted for international movement by post)</td>
<td>UN number, preceded by the letters “UN” for each applicable UN number in the overpack</td>
</tr>
</tbody>
</table>

Consignment accepted for international movement by post The requirement of para. 581

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a See Table 1 for listing of UN numbers and proper shipping names.

533. Each package of gross mass exceeding 50 kg shall have its permissible gross mass legibly and durably marked on the outside of the packaging.

534. Each package that conforms to:

(a) An IP-1, IP-2 or IP-3 design shall be legibly and durably marked on the outside of the packaging with “TYPE IP-1”, “TYPE IP-2” or “TYPE IP-3” as appropriate.
(b) A Type A package design shall be legibly and durably marked on the outside of the packaging with “TYPE A”.
(c) An IP-2, IP-3 or a Type A package design shall be legibly and durably marked on the outside of the packaging with the international vehicle registration code (VRI code) of the country of origin of design and either the name of the manufacturer or other identification of the packaging specified by the competent authority of the country of origin of design.

535. Each package that conforms to a design approved under one or more of the paras 807–816 and 818 shall be legibly and durably marked on the outside of the packaging with the following information:

(a) The identification mark allocated to that design by the competent authority;
(b) A serial number to uniquely identify each packaging that conforms to that design;
“TYPE B(U)”, “TYPE B(M)” or “TYPE C”, in the case of a Type B(U), Type B(M) or Type C package design.

536. Each package that conforms to a Type B(U), Type B(M) or Type C package design shall have the outside of the outermost receptacle, that is resistant to the effects of fire and water, plainly marked by embossing, stamping or other means resistant to the effects of fire and water with the trefoil symbol shown in Fig. 1.

537. Where LSA-I or SCO-I material is contained in receptacles or wrapping materials and is transported under exclusive use as permitted by para. 520, the outer surface of these receptacles or wrapping materials may bear the marking “RADIOACTIVE LSA-I” or “RADIOACTIVE SCO-I” as appropriate.

FIG. 1. Basic trefoil symbol with proportions based on a central circle of radius X. The minimum allowable size of X shall be 4 mm.

Labelling

538. Each package, overpack and freight container shall bear the labels conforming to the applicable models in Figs 2–4, except as allowed under the alternative provisions of para. 543 for large freight containers and tanks, according to the appropriate category. In addition, each package, overpack and freight container containing fissile material, other than fissile material excepted under the provisions of para. 417, shall bear labels conforming to the model in Fig. 5. Any labels that do not relate to the contents shall be removed or covered. For radioactive material having other dangerous properties see para. 507.

539. The labels conforming to the applicable models in Figs 2–4 shall be affixed to two opposite sides of the outside of a package or overpack or on the outside of all four sides of a freight container or tank. The labels conforming to the model in Fig. 5, where applicable, shall be affixed adjacent to the labels conforming to the applicable models in Figs 2–4. The labels shall not cover the markings specified in paras 531–536.

FIG. 2. Category I-WHITE label. The background colour of the label shall be white, the colour of the trefoil and the printing shall be black, and the colour of the category bar shall be red.

FIG. 3. Category II-yellow label. The background colour of the upper half of the label shall be yellow and the lower half white, the colour of the trefoil and the printing shall be black, and the colour of the category bars shall be red.

FIG. 4. Category iii-yellow label. The background colour of the upper half of the label shall be yellow and the lower half white, the colour of the trefoil and the printing shall be black, and the colour of the category bars shall be red.

Labelling for radioactive contents

540. Each label conforming to the applicable models in Figs 2–4 shall be completed with the following information:

(a) Contents:

(i) Except for LSA-I material, the name(s) of the radionuclide(s) as taken from Table 2, using the symbols prescribed therein. For mixtures of radionuclides, the most restrictive nuclides must be listed to the extent the space on the line permits. The group of LSA or SCO shall be shown following the name(s) of the radionuclide(s). The terms “LSA-II”, “LSA-III”, “SCO-I” and “SCO-II” shall be used for this purpose.
(ii) For LSA-I material, the term “LSA-I” is all that is necessary; the name of the radionuclide is not necessary.
(b) Activity: The maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with the appropriate SI prefix symbol (see Annex II). For fissile material, the total mass of fissile nuclides in units of grams (g), or multiples thereof, may be used in place of activity.
(c) For overpacks and freight containers the “contents” and “activity” entries on the label shall bear the information required in paras 540(a) and (b), respectively, totalled together for the entire contents of the overpack or freight container except that on labels for overpacks or freight containers containing mixed loads of packages containing different radionuclides, such entries may read “See Transport Documents”.
(d) TI: The number determined in accordance with paras 523 and 524 (no TI entry is required for Category I-WHITE).

FIG. 3. Category II-yellow label. The background colour of the upper half of the label shall be yellow and the lower half white, the colour of the trefoil and the printing shall be black, and the colour of the category bars shall be red.

FIG. 4. Category iii-yellow label. The background colour of the upper half of the label shall be yellow and the lower half white, the colour of the trefoil and the printing shall be black, and the colour of the category bars shall be red.

**Labelling for criticality safety**

541. Each label conforming to the model in Fig. 5 shall be completed with the CSI as stated in the certificate of approval applicable in the countries through or into which the consignment is transported and issued by the competent authority or as specified in paras 674 or 675.

FIG. 5. CSI label. The background colour of the label shall be white, the colour of the printing shall be black.

542. For overpacks and freight containers, the label conforming to the model in Fig. 5 shall bear the sum of the CSIs of all the packages contained therein.

**Placarding**

543. Large freight containers carrying packages other than excepted packages, and tanks, shall bear four placards that conform to the model given in Fig. 6. The placards shall be affixed in a vertical orientation to each side wall and to each end wall of the large freight container or tank. Any placards that do not relate to the contents shall be removed. Instead of using both labels and placards, it is permitted as an alternative to use enlarged labels only, where appropriate, as shown in Figs 2–4, except having the minimum size shown in Fig. 6.

544. Where the consignment in the freight container or tank is unpackaged LSA-I or SCO-I or where a consignment in a freight container is required to be shipped under exclusive use and is packaged radioactive material with a single UN number, the
appropriate UN number for the consignment (see Table 1) shall also be displayed, in black digits not less than 65 mm high, either:

(a) In the lower half of the placard shown in Fig. 6 and against the white background; or

(b) On the placard shown in Fig. 7;

When the alternative given in (b) is used, the subsidiary placard shall be affixed immediately adjacent to the main placard, on all four sides of the freight container or tank.

FIG. 6. Placard. Except as permitted by para. 571, minimum dimensions shall be as shown; when different dimensions are used, the relative proportions must be maintained. The number ‘7’ shall not be less than 25 mm high. The background colour of the upper half of the placard shall be yellow and of the lower half white, the colour of the trefoil and the printing shall be black. The use of the word “RADIOACTIVE” in the bottom half is optional, to allow the alternative use of this placard to display the appropriate UN number for the consignment.

FIG. 7. Placard for separate display of UN number. The background colour of the placard shall be orange and the border and UN number shall be black. The symbol “****” denotes the space in which the appropriate UN number for radioactive material, as specified in Table 1, shall be displayed.

(vvvv) CONSIGNOR’S RESPONSIBILITIES

545. Except as otherwise provided in these Regulations, no person may offer radioactive material for transport unless it is properly marked, labelled, placarded, described and certified on a transport document, and otherwise in a condition for transport as required by these Regulations.

Particulars of consignment

546. The consignor shall include in the transport documents with each consignment the identification of the consignor and consignee, including their names and addresses and the following information, as applicable, in the order given:

(a) The UN number assigned to the material as specified in accordance with the provisions of paras 401 and 530, preceded by the letters “UN”; 

(b) The proper shipping name, as specified in accordance with the provisions of paras 401 and 530;

(c) The UN class number “7” in accordance with the UN Model Regulations [10];

(d) The subsidiary hazard class or division number(s) corresponding to the subsidiary risk label(s) required to be applied, when assigned, shall be entered following the primary hazard class or division and shall be enclosed in parenthesis;

(e) The name or symbol of each radionuclide or, for mixtures of radionuclides, an appropriate general description or a list of the most restrictive nuclides;

(f) A description of the physical and chemical form of the material, or a notation that the material is special form radioactive material or low dispersible radioactive material. A generic chemical description is acceptable for chemical form;

(g) The maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with the appropriate SI prefix symbol (see Annex II). For fissile material, the mass of fissile material (or mass of each fissile nuclide for mixtures when...
appropriate) in units of grams (g), or appropriate multiples thereof, may be used in place of activity:

(h) The category of the package, i.e. I-WHITE, II-YELLOW, III-YELLOW;

(i) The TI (categories II-YELLOW and III-YELLOW only);

(j) For fissile material:

(i) Shipped under one exception of sub-paras 417(a)-(f), reference to that para;

(ii) Shipped under para. 417(c)-(e), the total mass of fissile nuclides;

(iii) Contained in a package for which one of paras 674(a)-(c) or 675 is applied, reference to that para;

(iv) The CSI, where applicable.

(k) The identification mark for each competent authority certificate of approval (special form radioactive material, low dispersible radioactive material, fissile material excepted under para. 417(f), special arrangement, package design or shipment) applicable to the consignment;

(l) For consignments of more than one package, the information contained in paras 546(a)-(k) shall be given for each package. For packages in an overpack, freight container or conveyance, a detailed statement of the contents of each package within the overpack, freight container or conveyance and, where appropriate, of each overpack, freight container or conveyance shall be included. If packages are to be removed from the overpack, freight container or conveyance at a point of intermediate unloading, appropriate transport documents shall be made available;

(m) Where a consignment is required to be shipped under exclusive use, the statement “EXCLUSIVE USE SHIPMENT;

(n) For LSA-II, LSA-III, SCO-I and SCO-II, the total activity of the consignment as a multiple of A$_2$. For radioactive material for which the A$_2$ value is unlimited, the multiple of A$_2$ shall be zero.

FIG. 6. Placard. Except as permitted by para. 571, minimum dimensions shall be as shown; when different dimensions are used, the relative proportions must be maintained. The number ‘7’ shall not be less than 25 mm high. The background colour of the upper half of the placard shall be yellow and of the lower half white, the colour of the trefoil and the printing shall be black. The use of the word “RADIOACTIVE” in the bottom half is optional, to allow the alternative use of this placard to display the appropriate UN number for the consignment.

FIG. 7. Placard for separate display of UN number. The background colour of the placard shall be orange and the border and UN number shall be black. The symbol “****” denotes the space in which the appropriate UN number for radioactive material, as specified in Table 1, shall be displayed.

**Consignor’s certification or declaration**

547. The consignor shall include in the transport documents a certification or declaration in the following terms:

“I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport in accordance with the applicable international and national governmental regulations.”
548. If the intent of the declaration is already a condition of transport within a particular international convention, the consignor need not provide such a declaration for that part of the transport covered by the convention.

549. The declaration shall be signed and dated by the consignor. Facsimile signatures are acceptable where applicable laws and regulations recognize the legal validity of facsimile signatures.

550. If the dangerous goods documentation is presented to the carrier by means of electronic data processing (EDP) or electronic data interchange (EDI) transmission techniques, the signature(s) may be replaced by the name(s) (in capitals) of the person authorized to sign.

551. When radioactive material, other than when carried in tanks, is packed or loaded into any freight container or vehicle that will be transported by sea, those responsible for packing the container or vehicle shall provide a container/vehicle packing certificate specifying the container/vehicle identification number(s) and certifying that the operation has been carried out in accordance with the applicable conditions of the IMDG Code [8].

552. The information required in the transport documents and the container/vehicle packing certificate may be incorporated into a single document, if not, the documents shall be attached one to the other. If the information is incorporated into a single document, the document shall include a signed declaration such as: “It is declared that the packing of the goods into the container/vehicle has been carried out in accordance with the applicable provisions”.

This declaration shall be dated and the person signing it shall be identified on the document. Facsimile signatures are acceptable where applicable laws and regulations recognize the legal validity of facsimile signatures.

553. The declaration shall be made on the same transport document that contains the particulars of consignment listed in para. 546.

Information for carriers

554. The consignor shall provide in the transport documents a statement regarding actions, if any that are required to be taken by the carrier. The statement shall be in the languages deemed necessary by the carrier or the authorities concerned, and shall include at least the following points:

(a) Supplementary requirements for loading, stowage, carriage, handling and unloading of the package, overpack or freight container, including any special stowage provisions for the safe dissipation of heat (see para. 565), or a statement that no such requirements are necessary;

(b) Restrictions on the mode of transport or conveyance and any necessary routeing instructions;

(c) Emergency arrangements appropriate to the consignment;

555. The consignor shall retain a copy of each of the transport documents containing the information specified in paras 546, 547, 551, 552 and 554, as applicable, for a minimum period of three months.

When the documents are kept electronically, the consignor shall be able to reproduce them in a printed form.

556. The applicable competent authority certificates need not necessarily accompany the consignment. The consignor shall make them available to the carrier(s) before loading and unloading.
Notification of competent authorities

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

558. For each shipment listed in (a), (b), (c) or (d) below, the consignor shall notify the competent authority of the country of origin of the shipment and the competent authority of each country through or into which the consignment is to be transported. This notification shall be in the hands of each competent authority prior to the commencement of the shipment, and preferably at least 7 days in advance.

(a) Type C packages containing radioactive material with an activity greater than 3000 $A_1$ or 3000 $A_2$, as appropriate, or 1000 TBq, whichever is the lower;
(b) Type B(U) packages containing radioactive material with an activity greater than 3000 $A_1$ or 3000 $A_2$, as appropriate, or 1000 TBq, whichever is the lower;
(c) Type B(M) packages;
(d) Shipments under special arrangement.

559. The consignment notification shall include:

(a) Sufficient information to enable the identification of the package or packages including all applicable certificate numbers and identification marks;
(b) Information on the date of shipment, the expected date of arrival and proposed routeing;
(c) The names of the radioactive materials or nuclides;
(d) Descriptions of the physical and chemical forms of the radioactive material, or whether it is special form radioactive material or low dispersible radioactive material;
(e) The maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with the appropriate SI prefix symbol (see Annex II). For fissile material, the mass of fissile material (or the mass of each fissile nuclide for a mixture, when appropriate) in units of grams (g), or multiples thereof, may be used in place of activity.

560. The consignor is not required to send a separate notification if the required information has been included in the application for approval of shipment (see para. 826827).

Possession of certificates and instructions

561. The consignor shall have in his or her possession a copy of each certificate required under Section VIII of these Regulations and a copy of the instructions with regard to the proper closing of the package and other preparations for shipment before making any shipment under the terms of the certificates.

TRANSPORT AND STORAGE IN TRANSIT
Segregation during transport and storage in transit
562. Packages, overpacks and freight containers containing radioactive material and unpackaged radioactive material shall be segregated during transport and during storage in transit:
   (a) From workers in regularly occupied working areas by distances calculated using a dose criterion of 5 mSv in a year and conservative model parameters;
   (b) From members of the critical group of the public, in areas where the public has regular access, by distances calculated using a dose criterion of 1 mSv in a year and conservative model parameters;
   (c) From undeveloped photographic film by distances calculated using a radiation exposure criterion for undeveloped photographic film due to the transport of radioactive material of 0.1 mSv per consignment of such film;
   (d) From other dangerous goods in accordance with para. 506.

563. Category II-YELLOW or III-YELLOW packages or overpacks shall not be carried in compartments occupied by passengers, except those exclusively reserved for couriers specially authorized to accompany such packages or overpacks.

Stowage during transport and storage in transit

564. Consignments shall be securely stowed.

565. Provided that its average surface heat flux does not exceed 15 W/m² and that the immediate surrounding cargo is not in sacks or bags, a package or overpack may be carried or stored among packaged general cargo without any special stowage provisions except as may be specifically required by the competent authority in an applicable certificate of approval.

566. Loading of freight containers and accumulation of packages, overpacks and freight containers shall be controlled as follows:
   (a) Except under the condition of exclusive use, and for consignments of LSA-I material, the total number of packages, overpacks and freight containers aboard a single conveyance shall be so limited that the sum of the TIs aboard the conveyance does not exceed the values shown in Table 10;
   (b) The radiation level under routine conditions of transport shall not exceed 2 mSv/h at any point on, and 0.1 mSv/h at 2 m from, the external surface of the conveyance, except for consignments transported under exclusive use by road or rail, for which the radiation limits around the vehicle are set forth in paras. 573(b) and (c);
   (c) The sum of the CSIs in a freight container and aboard a conveyance shall not exceed the values shown in Table 11.
<table>
<thead>
<tr>
<th>Type of freight container or conveyance</th>
<th>Limit on sum of TIs in a freight container or aboard a conveyance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight container</td>
<td></td>
</tr>
<tr>
<td>Small freight container</td>
<td>50</td>
</tr>
<tr>
<td>Large freight container</td>
<td>50</td>
</tr>
<tr>
<td>Vehicle</td>
<td>50</td>
</tr>
<tr>
<td>Aircraft:</td>
<td></td>
</tr>
<tr>
<td>Passenger</td>
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</tr>
<tr>
<td>Cargo</td>
<td>200</td>
</tr>
<tr>
<td>Inland waterway craft</td>
<td>50</td>
</tr>
<tr>
<td>Seagoing vessel**:</td>
<td></td>
</tr>
<tr>
<td>(i) Hold, compartment or defined deck area:</td>
<td></td>
</tr>
<tr>
<td>packages, overpacks, small freight containers</td>
<td>50</td>
</tr>
<tr>
<td>Large freight containers</td>
<td>200</td>
</tr>
<tr>
<td>(ii) Total vessel:</td>
<td></td>
</tr>
<tr>
<td>Packages, overpacks, small freight containers</td>
<td>200</td>
</tr>
<tr>
<td>Large freight containers</td>
<td>No limit</td>
</tr>
</tbody>
</table>

*a Packages or overpacks carried in or on a vehicle that are in accordance with the provisions of para. 573 may be transported by vessels provided that they are not removed from the vehicle at any time while on board the vessel.

567. Any package or overpack having a TI greater than 10, or any consignment having a CSI greater than 50, shall be transported only under exclusive use.

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

568. Any group of packages, overpacks and freight containers containing fissile material stored in transit in any one storage area shall be so limited that the sum of the CSIs in the group does not exceed 50. Each group shall be stored so as to maintain a spacing of at least 6 m from other such groups.
<table>
<thead>
<tr>
<th>Type of freight container or conveyance</th>
<th>Limit on sum of CSIs in a freight container or aboard a conveyance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not under exclusive use</td>
</tr>
<tr>
<td><strong>Freight container</strong></td>
<td></td>
</tr>
<tr>
<td>Small freight container</td>
<td>50</td>
</tr>
<tr>
<td>Large freight container</td>
<td>50</td>
</tr>
<tr>
<td>Vehicle</td>
<td>50</td>
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<tr>
<td><strong>Aircraft:</strong></td>
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<tr>
<td>Passenger</td>
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<tr>
<td>Cargo</td>
<td>50</td>
</tr>
<tr>
<td>Inland waterway craft</td>
<td>50</td>
</tr>
<tr>
<td><strong>Seagoing vessel</strong></td>
<td></td>
</tr>
<tr>
<td>(i) Hold, compartment or defined deck area:</td>
<td></td>
</tr>
<tr>
<td>Packages, Overpacks, small freight containers</td>
<td>50</td>
</tr>
<tr>
<td>Large freight containers</td>
<td>50</td>
</tr>
<tr>
<td>(ii) Total vessel:</td>
<td></td>
</tr>
<tr>
<td>Packages, overpacks, small freight containers</td>
<td>200&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Large freight containers</td>
<td>No limit&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Packages or overpacks carried in or on a vehicle that are in accordance with the provisions of para. 573 may be transported by vessels provided that they are not removed from the vehicle at anytime while on board the vessel. In this case the entries under the heading ‘under exclusive use’ apply.

<sup>b</sup> The consignment shall be so handled and stowed that the sum of CSIs in any group does not exceed 50, and that each group is handled and stowed so as to maintain a spacing of at least 6 m from other groups so that the groups are separated from each other by at least 6 m.

<sup>c</sup> The consignment shall be so handled and stowed that the sum of CSIs in any group does not exceed 100, and that each group is handled and stowed so as to maintain a spacing of at least 6 m from other groups that the groups are separated from each other by at least 6 m. The intervening space between groups may be occupied by other cargo in accordance with para. 506.

569. Where the sum of the CSIs on board a conveyance or in a freight container exceeds 50, as permitted in Table 11, storage shall be such as to maintain a spacing of at least 6 m from other groups of packages, overpacks or freight containers containing fissile material or other conveyances carrying radioactive material.
570. *Fissile material* meeting one of the provisions (a)-(f) of para. 417 is excepted from the requirement to be transported in *packages* that are classified as FISSILE if the following *consignment* conditions are to meet the following requirements:

(f) Only one of the provisions (a)-(f) of para. 417 is allowed per *consignment*;

(g) Only one approved *fissile material* in *packages* classified in accordance with para. 417(f) is allowed per *consignment* unless multiple materials are authorized in the certificate of approval;

(h) *Fissile material* in *packages* classified in accordance with para. 417(c) shall be transported in a *consignment* with no more than 45 g of *fissile nuclides*;

(i) *Fissile material* in *packages* classified in accordance with para. 417(d) shall be transported in a *consignment* with no more than 15 g of *fissile nuclides*;

(j) Unpackaged or packaged *fissile material* classified in accordance with para. 417(e) shall be transported under *exclusive use* on a *conveyance* with no more than 45 g of *fissile nuclides*.

**Additional requirements relating to transport by rail and by road**

571. Rail and road *vehicles* carrying *packages*, *overpacks* or *freight containers* labelled with any of the labels shown in Figs 2-5, or carrying *consignments* under *exclusive use*, shall display the placard shown in Fig. 6 on each of:

(a) The two external lateral walls in the case of a rail *vehicle*;

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

In the case of a *vehicle* without sides, the placards may be affixed directly on the cargo carrying unit provided that they are readily visible; in the case of large *tanks* or *freight containers*, the placards on the *tanks* or *freight containers* shall suffice. In the case of *vehicles* that have insufficient area to allow the fixing of larger placards, the dimensions of the placard described in Fig. 6 may be reduced to 100 mm. Any placards that do not relate to the contents shall be removed.

572. Where the *consignment* in or on the *vehicle* is unpackaged *LSA-I* material or *SCO-I* or where a *consignment* is required to be shipped under *exclusive use* and is packaged *radioactive material* with a single UN number, the appropriate UN number (see Table 1) shall also be displayed, in black digits not less than 65 mm high, either:

(a) In the lower half of the placard shown in Fig. 6, against the white background; or

(b) On the placard shown in Fig. 7;

When the alternative given in (b) is used, the subsidiary placard shall be affixed immediately adjacent to the main placard, either on the two external lateral walls in the case of a rail *vehicle* or on the two external lateral walls and the external rear wall in the case of a road *vehicle*.

573. For *consignments* under *exclusive use*, the *radiation level* shall not exceed:

(a) 10 mSv/h at any point on the external surface of any *package* or *overpack*, and may only exceed 2 mSv/h provided that:

(i) The *vehicle* is equipped with an enclosure that, during routine conditions of transport, prevents the access of unauthorized persons to the interior of the enclosure.
Provisions are made to secure the **package** or **overpack** so that its position within the **vehicle** enclosure remains fixed during routine conditions of transport.

There is no loading or unloading during the **shipment**.

2 mSv/h at any point on the outer surfaces of the **vehicle**, including the upper and lower surfaces, or, in the case of an open **vehicle**, at any point on the vertical planes projected from the outer edges of the **vehicle**, on the upper surface of the load, and on the lower external surface of the **vehicle**;

0.1 mSv/h at any point 2 m from the vertical planes represented by the outer lateral surfaces of the **vehicle**, or, if the load is transported in an open **vehicle**, at any point 2 m from the vertical planes projected from the outer edges of the **vehicle**.

In the case of road **vehicles**, no persons other than the driver and assistants shall be permitted in **vehicles** carrying **packages**, **overpacks** or **freight containers** bearing category II-YELLOW or III-YELLOW labels.

### Additional requirements relating to transport by vessels

Packages or **overpacks** having a surface **radiation level** greater than 2 mSv/h, unless being carried in or on a **vehicle** under exclusive use in accordance with Table 10, footnote (a), shall not be transported by **vessel** except under special arrangement.

The transport of **consignments** by means of a special use **vessel** that, by virtue of its **design**, or by reason of its being chartered, is dedicated to the purpose of carrying **radioactive material**, shall be excepted from the requirements specified in para. 566 provided that the following conditions are met:

(a) A **radiation protection programme** for the **shipment** shall be approved by the competent authority of the flag state of the **vessel** and, when requested, by the competent authority at each port of call;

(b) Stowage arrangements shall be predetermined for the whole voyage, including any **consignments** to be loaded at ports of call en route;

(c) The loading, carriage and unloading of the **consignments** shall be supervised by persons qualified in the transport of **radioactive material**.

### Additional requirements relating to transport by air

**Type B(M) packages** and **consignments** under exclusive use shall not be transported on passenger aircraft.

Vented **Type B(M) packages**, **packages** that require external cooling by an ancillary cooling system, **packages** subject to operational controls during transport and **packages** containing liquid pyrophoric materials shall not be transported by air.

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

### Additional requirements relating to transport by post

A **consignment** that conforms to the requirements of para. 515, in which the activity of the **radioactive contents** does not exceed one tenth of the limits prescribed in Table 4, and that does not contain more than 10 g of uranium hexafluoride per **package**, may be accepted for domestic movement by national postal authorities, subject to such additional requirements as those authorities may prescribe.
A consignment that conforms to the requirements of para. 515, in which the activity of the radioactive contents does not exceed one tenth of the limits prescribed in Table 4, and that does not contain more than 10 g of uranium hexafluoride per package, may be accepted for international movement by post, subject in particular to the following additional requirements as prescribed by the Acts of the Universal Postal Union:

(a) It shall be deposited with the postal service only by consignors authorized by the national authority.
(b) It shall be dispatched by the quickest route, normally by air.
(c) It shall be plainly and durably marked on the outside with the words “RADIOACTIVE MATERIAL — QUANTITIES PERMITTED FOR MOVEMENT BY POST”. These words shall be crossed out if the packaging is returned empty.
(d) It shall carry on the outside the name and address of the consignor with the request that the consignment be returned in the case of non-delivery.
(e) The name and address of the consignor and the contents of the consignment shall be indicated on the internal packaging.

CUSTOMS OPERATIONS

Customs operations involving the inspection of the radioactive contents of a package shall be carried out only in a place where adequate means of controlling radiation exposure are provided and in the presence of qualified persons. Any package opened on customs instructions shall, before being forwarded to the consignee, be restored to its original condition.

UNDELIVERABLE CONSIGNMENTS

Where a consignment is undeliverable, it shall be placed in a safe location and the appropriate competent authority shall be informed as soon as possible and a request made for instructions on further action.

RETENTION AND AVAILABILITY of TRANSPORT DOCUMENTS by carriers

A carrier shall not accept a consignment for transport unless:
(a) A copy of the transport document and other documents or information as required by these Regulations are provided; or
(b) The information applicable to the consignment is provided in electronic form.

The information applicable to the consignment shall accompany the consignment to final destination. This information may be on the transport document or may be on another document. This information shall be given to the consignee when the consignment is delivered.

When the information applicable to the consignment is given to the carrier in electronic form, the information shall be available to the carrier at all times during transport to final destination. The information shall be able to be produced without delay as a paper document.

The carrier shall retain a copy of the transport document and additional information and documentation as specified in these Regulations, for a minimum period of three months.
When the documents are kept electronically or in a computer system, the carrier shall be capable of reproducing them in a printed form.
Requirements for LSA-III material
601. LSA-III material shall be a solid of such a nature that if the entire contents of a package were subjected to the test specified in para. 703, the activity in the water would not exceed $0.1A_2$.

Requirements for special form radioactive material
602. Special form radioactive material shall have at least one dimension of not less than 5 mm.
603. Special form radioactive material shall be of such a nature or shall be so designed that if it is subjected to the tests specified in paras 704–711, it shall meet the following requirements:
(a) It would not break or shatter under the impact, percussion and bending tests in paras 705-707 and 709(a), as applicable.
(b) It would not melt or disperse in the heat test in para. 708 or para. 709(b), as applicable.
(c) The activity in the water from the leaching tests specified in paras 710 and 711 would not exceed 2 kBq; or alternatively, for sealed sources, the leakage rate for the volumetric leakage assessment test specified in the International Organization for Standardization document ISO 9978: Radiation Protection — Sealed Radioactive Sources — Leakage Test Methods [9], would not exceed the applicable acceptance threshold acceptable to the competent authority.
604. When a sealed capsule constitutes part of the special form radioactive material, the capsule shall be so manufactured that it can be opened only by destroying it.

Requirements for low dispersible radioactive material
605. Low dispersible radioactive material shall be such that the total amount of this radioactive material in a package shall meet the following requirements:
(a) The radiation level at 3 m from the unshielded radioactive material does not exceed 10 mSv/h.
(b) If subjected to the tests specified in paras 736 and 737, the airborne release in gaseous and particulate forms of up to 100 μm aerodynamic equivalent diameter would not exceed $10A_2$. A separate specimen may be used for each test.
(c) If subjected to the test specified in para. 703 the activity in the water would not exceed $100A_2$. In the application of this test, the damaging effects of the tests specified in (b) shall be taken into account.

Requirements for additional material for exception from classification as fissile
606. A fissile material excepted from classification as FISSILE under para. 417(f) shall be subcritical without the need for accumulation control under the following conditions:
(a) The conditions of para. 673(a);
(b) The conditions consistent with the assessment provisions stated in paras 684(b) and 685(b) for packages;
(c) The conditions specified in para. 683(a), if transported by air.

(eeee) GENERAL REQUIREMENTS FOR ALL PACKAGINGS AND PACKAGES

607. The package shall be so designed in relation to its mass, volume and shape that it can be easily and safely transported. In addition, the package shall be so designed that it can be properly secured in or on the conveyance during transport.

608. The design shall be such that any lifting attachments on the package will not fail when used in the intended manner and that if failure of the attachments should occur, the ability of the package to meet other requirements of these Regulations would not be impaired. The design shall take account of appropriate safety factors to cover snatch lifting.

609. Attachments and any other features on the outer surface of the package that could be used to lift it shall be designed either to support its mass in accordance with the requirements of para. 608, or shall be removable or otherwise rendered incapable of being used during transport.

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

611. As far as practicable, the outer layer of the package shall be so designed as to prevent the collection and the retention of water.

612. Any features added to the package at the time of transport that are not part of the package shall not reduce its safety.

613. The package shall be capable of withstanding the effects of any acceleration, vibration or vibration resonance that may arise under routine conditions of transport without any deterioration in the effectiveness of the closing devices on the various receptacles or in the integrity of the package as a whole. In particular, nuts, bolts and other securing devices shall be so designed as to prevent them from becoming loose or being released unintentionally, even after repeated use.

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

615. All valves through which the radioactive contents could escape shall be protected against unauthorized operation.

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

617. A package shall be so designed that it provides sufficient shielding to ensure that, under routine conditions of transport and with the maximum radioactive contents that the package is designed to contain, the radiation level at any point on the external surface of the package would not exceed the values specified in paras 516, 527 and 528, as applicable, with account taken of paras 566(b) and 573.

618. For radioactive material having other dangerous properties, the package design shall take into account those properties (see paras 110 and 507).
ADDITIONAL REQUIREMENTS FOR PACKAGES TRANSPORTED BY AIR
619. For packages to be transported by air, the temperature of the accessible surfaces shall not exceed 50°C at an ambient temperature of 38°C with no account taken for insolation.
620. Packages to be transported by air shall be so designed that, if they were exposed to ambient temperatures ranging from –40°C to +55°C, the integrity of containment would not be impaired.
621. Packages containing radioactive material to be transported by air shall be capable of withstanding, without loss or dispersal of radioactive contents from the containment system, an internal pressure that produces a pressure differential of not less than maximum normal operating pressure plus 95kPa.

REQUIREMENTS FOR EXCEPTED PACKAGES
622. An excepted package shall be designed to meet the requirements specified in paras 607–618 and, in addition, the requirements of paras 619–621 if carried by air.

REQUIREMENTS FOR INDUSTRIAL PACKAGES
Requirements for Type IP-1
623. A Type IP-1 package shall be designed to meet the requirements specified in paras 607–618 and 636, and, in addition, the requirements of paras 619–621 if carried by air.

Requirements for Type IP-2
624. A package to be qualified as a Type IP-2 shall be designed to meet the requirements for Type IP-1 as specified in para. 623 and, in addition, if it were subjected to the tests specified in paras 722 and 723, it would prevent:
(a) Loss or dispersal of the radioactive contents;
(b) More than a 20% increase in the maximum radiation level at any external surface of the package.

Requirements for Type IP-3
625. A package to be qualified as a Type IP-3 shall be designed to meet the requirements for Type IP-1 as specified in para. 623 and, in addition, the requirements specified in paras 636–649.

Alternative requirements for Type IP-2 and Type IP-3
626. Packages may be used as Type IP-2, provided that:
(a) They satisfy the requirements for Type IP-1 specified in para. 623.
(b) They are designed to satisfy the requirements prescribed for UN Packing Group I or II in Chapter 6.1 of the United Nations Recommendations on the Transport of Dangerous Goods, Model Regulations [10].
(c) When subjected to the tests required for UN Packing Group I or II, they would prevent:
(i) Loss or dispersal of the radioactive contents.
(ii) More than a 20% increase in the maximum radiation level at any external surface of the package.
627. Portable tanks may also be used as Type IP-2 or Type IP-3, provided that:
(a) They satisfy the requirements for Type IP-1 specified in para. 623.
(b) They are designed to satisfy the requirements prescribed in Chapter 6.7 of the United Nations Recommendations on the Transport of Dangerous Goods, Model...
Regulations [10], or other requirements at least equivalent, and are capable of withstanding a test pressure of 265 kPa.

c) They are designed so that any additional shielding that is provided shall be capable of withstanding the static and dynamic stresses resulting from handling and routine conditions of transport and of preventing more than a 20% increase in the maximum *radiation level* at any external surface of the portable tanks.

628. *Tanks*, other than portable *tanks*, may also be used as Type IP-2 or Type IP-3 for transporting *LSA-I* and *LSA-II* liquids and gases as prescribed in Table 5, provided that:

(a) They satisfy the requirements for Type IP-1 specified in para. 623.

(b) They are designed to satisfy the requirements prescribed in regional or national regulations for the transport of dangerous goods and are capable of withstanding a test pressure of 265 kPa.

(c) They are designed so that any additional shielding that is provided shall be capable of withstanding the static and dynamic stresses resulting from handling and routine conditions of transport and of preventing more than a 20% increase in the maximum *radiation level* at any external surface of the *tanks*.

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

(a) The *radioactive contents* are restricted to solid materials.

(b) They satisfy the requirements for Type IP-1 specified in para. 623.

(c) They are designed to conform to the International Organization for Standardization document ISO 1496/1: Series 1 *Freight Containers* — Specifications and Testing — Part 1: General Cargo Containers for General Purposes [11] excluding dimensions and ratings. They shall be designed such that if subjected to the tests prescribed in that document and to the accelerations occurring during routine conditions of transport they would prevent:

(i) Loss or dispersal of the *radioactive contents*.

(ii) More than a 20% increase in the maximum *radiation level* at any external surface of the *freight containers*.

630. Metal *IBC* may also be used as Type IP-2 or Type IP-3, provided that:

(a) They satisfy the requirements for Type IP-1 specified in para. 623.

(b) They are designed to satisfy the requirements prescribed for UN Packing Group I or II in Chapter 6.5 of the United Nations Recommendations on the Transport of Dangerous Goods: Model Regulations [10], and if they were subjected to the tests prescribed in that document, but with the drop test conducted in the most damaging orientation, they would prevent:

(i) Loss or dispersal of the *radioactive contents*.

(ii) More than a 20% increase in the maximum *radiation level* at any external surface of the *IBC*.

(iii) **REQUIREMENTS FOR PACKAGES CONTAINING URANIUM HEXAFLUORIDE**

631. *Packages* designed to contain uranium hexafluoride shall meet the requirements that pertain to the radioactive and fissile properties of the material prescribed elsewhere in these Regulations. Except as allowed in para. 634, uranium hexafluoride in quantities of 0.1 kg or more shall also be packaged and transported in accordance with the provisions of the International Organization for Standardization document ISO 7195:
Packaging of Uranium Hexafluoride (UF6) for Transport [12], and the requirements of paras 632 and 633.

632. Each package designed to contain 0.1 kg or more of uranium hexafluoride shall be designed so that it will meet the following requirements:
(a) Withstand without leakage and without unacceptable stress, as specified in ISO 7195 [12], the structural test as specified in para. 718, except as allowed in para. 634;
(b) Withstand, without loss or dispersal of the uranium hexafluoride the free drop test specified in para. 722;
(c) Withstand, without rupture of the containment system the thermal test specified in para. 728, except as allowed in para. 634.

633. Packages designed to contain 0.1 kg or more of uranium hexafluoride shall not be provided with pressure relief devices.

634. Subject to multilateral approval, packages designed to contain 0.1 kg or more of uranium hexafluoride may be transported if the packages are designed:
(a) To international or national standards other than ISO 7195 [12], provided an equivalent level of safety is maintained; and/or
(b) To withstand, without leakage and without unacceptable stress, a test pressure of less than 2.76 MPa as specified in para. 718; and/or
(c) To contain 9000 kg or more of uranium hexafluoride, and the packages do not meet the requirement of para 632(c).

In all other respects, the requirements specified in paras 631–633 shall be satisfied.

REQUIREMENTS FOR TYPE A PACKAGES

635. Type A packages shall be designed to meet the requirements specified in paras 607–618 and, in addition, the requirements of paras 619–621 if carried by air, and of paras 636–651.

636. The smallest overall external dimension of the package shall not be less than 10 cm.

637. The outside of the package shall incorporate a feature such as a seal that is not readily breakable and which, while intact, will be evidence that the package has not been opened.

638. Any tie-down attachments on the package shall be so designed that, under normal and accident conditions of transport, the forces in those attachments shall not impair the ability of the package to meet the requirements of these Regulations.

639. The design of the package shall take into account temperatures ranging from –40°C to +70°C for the components of the packaging. Attention shall be given to freezing temperatures for liquids and to the potential degradation of packaging materials within the given temperature range.

640. The design and manufacturing techniques shall be in accordance with national or international standards, or other requirements, acceptable to the competent authority.

641. The design shall include a containment system securely closed by a positive fastening device that cannot be opened unintentionally or by a pressure that may arise within the package.

642. Special form radioactive material may be considered as a component of the containment system.
If the *containment system* forms a separate unit of the *package*, it shall be capable of being securely closed by a positive fastening device that is independent of any other part of the *packaging*.

The *design* of any component of the *containment system* shall take into account, where applicable, the radiolytic decomposition of liquids and other vulnerable materials and the generation of gas by chemical reaction and radiolysis.

The *containment system* shall retain its *radioactive contents* under a reduction of ambient pressure to 60 kPa.

All valves, other than pressure relief valves, shall be provided with an enclosure to retain any leakage from the valve.

A radiation shield that encloses a component of the *package* specified as a part of the *containment system* shall be so designed as to prevent the unintentional release of that component from the shield. Where the radiation shield and such component within it form a separate unit, the radiation shield shall be capable of being securely closed by a positive fastening device that is independent of any other *packaging* structure.

A *package* shall be so designed that, if it were subjected to the tests specified in paras 719–724, it would prevent:

(a) Loss or dispersal of the *radioactive contents*;

(b) More than a 20% increase in the maximum *radiation level* at any external surface of the *package*;

The *design* of a *package* intended for liquid *radioactive material* shall make provision for ullage to accommodate variations in the temperature of the contents, dynamic effects and filling dynamics.

A *Type A package* designed to contain liquid *radioactive material* shall, in addition:

(a) Be adequate to meet the conditions specified in para. 648(a) if the *package* is subjected to the tests specified in para. 725; and

(b) Either:

(i) Be provided with sufficient absorbent material to absorb twice the volume of the liquid contents. Such absorbent material must be suitably positioned so as to contact the liquid in the event of leakage; or

(ii) Be provided with a *containment system* composed of primary inner and secondary outer containment components designed to enclose the liquid contents completely and to ensure their retention within the secondary outer containment components, even if the primary inner components leak.

A *package* designed for gases shall prevent loss or dispersal of the *radioactive contents* if the *package* were subjected to the tests specified in para. 725. A *Type A package* designed for tritium gas or for noble gases shall be excepted from this requirement.

**REQUIREMENTS FOR TYPE B(U) PACKAGES**

*Type B(U) packages* shall be designed to meet the requirements specified in paras 607–618, the requirements specified in paras 619–621 if carried by air, and in paras 636–649, except as specified in para. 648(a), and, in addition, the requirements specified in paras 653–666.
653. A package shall be so designed that, under the ambient conditions specified in paras 656 and 657, heat generated within the package by the radioactive contents shall not, under normal conditions of transport, as demonstrated by the tests in paras 719–724, adversely affect the package in such a way that it would fail to meet the applicable requirements for containment and shielding if left unattended for a period of one week. Particular attention shall be paid to the effects of heat, that may cause one or more of the following:

(a) Alter the arrangement, the geometrical form or the physical state of the radioactive contents or, if the radioactive material is enclosed in a can or receptacle (for example, clad fuel elements), cause the can, receptacle or radioactive material to deform or melt;

(b) Lessen the efficiency of the packaging through differential thermal expansion, or cracking or melting of the radiation shielding material;

(c) In combination with moisture, accelerate corrosion.

654. A package shall be so designed that, under the ambient condition specified in para. 656 and in the absence of insolation, the temperature of the accessible surfaces of a package shall not exceed 50°C, unless the package is transported under exclusive use.

655. Except as required in para. 619 for a package transported by air, the maximum temperature of any surface readily accessible during transport of a package under exclusive use shall not exceed 85°C in the absence of insolation under the ambient conditions specified in para. 656. Account may be taken of barriers or screens intended to give protection to persons without the need for the barriers or screens being subject to any test.

656. The ambient temperature shall be assumed to be 38°C.

657. The solar insolation conditions shall be assumed to be as specified in Table 12.

658. A package that includes thermal protection for the purpose of satisfying the requirements of the thermal test specified in para. 728 shall be so designed that such protection will remain effective if the package is subjected to the tests specified in paras 719–724 and 727(a) and (b) or 727(b) and (c), as appropriate. Any such protection on the exterior of the package shall not be rendered ineffective by ripping, cutting, skidding, abrading or rough handling.

**TABLE 12. INSOLATION DATA**

<table>
<thead>
<tr>
<th>Case</th>
<th>Form and location of surface</th>
<th>Insolation for 12 h per day (W/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flat surfaces transported horizontally — downward facing</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Flat surfaces transported horizontally — upward facing</td>
<td>800</td>
</tr>
<tr>
<td>3</td>
<td>Surfaces transported vertically</td>
<td>200&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>4</td>
<td>Other downward facing (not horizontal) surfaces</td>
<td>200&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>5</td>
<td>All other surfaces</td>
<td>400&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Alternatively, a sine function may be used, with an absorption coefficient adopted and the effects of possible reflection from neighbouring objects neglected

659. A package shall be so designed that, if it were subjected to:
(a) The tests specified in paras 719–724, it would restrict the loss of radioactive contents to not more than $10^{-6}A_2$ per hour.

(b) The tests specified in paras 726, 727(b), 728 and 729 and either the test in para: -- 727(c), when the package has a mass not greater than 500 kg, an overall density not greater than 1000 kg/m³ based on the external dimensions, and radioactive contents greater than 1000 $A_2$ not as special form radioactive material; or -- 727(a), for all other packages.

(i) It would retain sufficient shielding to ensure that the radiation level 1 m from the surface of the package would not exceed 10 mSv/h with the maximum radioactive contents that the package is designed to contain;

(ii) It would restrict the accumulated loss of radioactive contents in a period of one week to not more than $10A_2$ for krypton-85 and not more than $A_2$ for all other radionuclides.

Where mixtures of different radionuclides are present, the provisions of paras 405–407 shall apply, except that for krypton-85 an effective $A_2(i)$ value equal to 10$A_2$ may be used. For case (a) the assessment shall take into account the external contamination limits of para. 508.

660. A package for radioactive contents with activity greater than $10^5 A_2$ shall be so designed that, if it were subjected to the enhanced water immersion test specified in para. 730, there would be no rupture of the containment system.

661. Compliance with the permitted activity release limits shall depend neither upon filters nor upon a mechanical cooling system.

662. A package shall not include a pressure relief system from the containment system that would allow the release of radioactive material to the environment under the conditions of the tests specified in paras 719–724 and 726–729.

663. A package shall be so designed that if it were at the maximum normal operating pressure and it were subjected to the tests specified in paras 719–724 and 726–729, the levels of strains in the containment system would not attain values that would adversely affect the package in such a way that it would fail to meet the applicable requirements.

664. A package shall not have a maximum normal operating pressure in excess of a gauge pressure of 700 kPa.

665. A package containing low dispersible radioactive material shall be so designed that any features added to the low dispersible radioactive material that are not part of it, or any internal components of the packaging, shall not adversely affect the performance of the low dispersible radioactive material.

666. A package shall be designed for an ambient temperature range from $-40^\circ$C to $+38^\circ$C.

(IIII) REQUIREMENTS FOR TYPE B(M) PACKAGES

667. Type B(M) packages shall meet the requirements for Type B(U) packages specified in para. 652, except that for packages to be transported solely within a specified country or solely between specified countries, conditions other than those given in paras 639, 655– 657 and 660– 666 may be assumed with the approval of the competent authorities of these countries. Notwithstanding, the requirements for Type B(U) packages specified in paras 655 and 660– 666 shall be met as far as practicable.
Intermittent venting of Type B(M) packages may be permitted during transport, provided that the operational controls for venting are acceptable to the relevant competent authorities.

Requirements for Type C Packages

Type C packages shall be designed to meet the requirements specified in paras 607–621 and 636–649, except as specified in para. 648(a), and the requirements specified in paras 653–657, 661–666 and 670–672.

A package shall be capable of meeting the assessment criteria prescribed for tests in paras 659(b) and 663 after burial in an environment defined by a thermal conductivity of 0.33 W/(m·K) and a temperature of 38°C in the steady state. Initial conditions for the assessment shall assume that any thermal insulation of the package remains intact, the package is at the maximum normal operating pressure and the ambient temperature is 38°C.

A package shall be so designed that, if it were at the maximum normal operating pressure and subjected to:
(a) The tests specified in paras 719–724, it would restrict the loss of radioactive contents to not more than $10^{-6}A_2$ per hour;
(b) The test sequences in para. 734:
   (i) It would retain sufficient shielding to ensure that the radiation level 1 m from the surface of the package would not exceed 10 mSv/h with the maximum radioactive contents that the package is designed to contain.
   (ii) It would restrict the accumulated loss of radioactive contents in a period of one week to not more than $10A_2$ for krypton-85 and not more than $A_2$ for all other radionuclides.

Where mixtures of different radionuclides are present, the provisions of paras 405–407 shall apply, except that for krypton-85 an effective $A_2(i)$ value equal to $10A_2$ may be used. For case (a), the assessment shall take into account the external contamination limits of para. 508.

A package shall be so designed that there will be no rupture of the containment system following performance of the enhanced water immersion test specified in para. 730.

Requirements for Packages Containing Fissile Material

Fissile material shall be transported so as to:
(a) Maintain subcriticality during routine, normal and accident conditions of transport; in particular, the following contingencies shall be considered:
   (i) Leakage of water into or out of packages;
   (ii) Loss of efficiency of built-in neutron absorbers or moderators;
   (iii) Rearrangement of the contents either within the package or as a result of loss from the package;
   (iv) Reduction of spaces within or between packages;
   (v) Packages becoming immersed in water or buried in snow;
   (vi) Temperature changes.
(b) Meet the requirements:
(i) Of para. 636 except for unpackaged material when specifically allowed by para. 417(e);
(ii) Prescribed elsewhere in these Regulations that pertain to the radioactive properties of the material;
(iii) Of para. 637 unless the material is excepted by para. 417;
(iv) Of paras 676–686, unless excepted by paras 417, 674 or 675.

674. Packages containing fissile material that meet subpara (d) and one of the provisions of subparas (a)–(c) of this paragraph are excepted from the requirements of paras 676–686.

The total mass of beryllium, hydrogenous material enriched in deuterium, graphite and other allotropic forms of carbon in an individual package shall not be greater than the mass of fissile nuclides in the package except where their total concentration does not exceed 1 g in any 1000 g of material. Beryllium incorporated in copper alloys up to 4% in weight of the alloy does not need to be considered.

(a) Packages containing fissile material in any form provided that:
(i) The smallest external dimension of the package is not less than 10 cm.
(ii) The CSI of the package is calculated using the following formula:
\[
CSI = 50 \times 5 \times \left( \frac{\text{mass of } U-235 \text{ in package (g)}}{Z} + \frac{\text{mass of other fissile nuclides}^1 \text{ in package (g)}}{Y} \right)
\]
where the values of Z and Y are taken from Table 13.
(iii) The CSI of any package does not exceed 10.
(b) Packages containing fissile material in any form provided that:
(i) The smallest external dimension of the package is not less than 30 cm;
(ii) The package, after being subjected to the tests specified in paras 719–724:
— Retains its fissile material contents;
— Preserves the minimum overall outside dimensions of the package to at least 30 cm;
— Prevents the entry of a 10 cm cube.
(iii) The CSI of the package is calculated using the following formula:
\[
CSI = 50 \times 2 \times \left( \frac{\text{mass of } U-235 \text{ in package (g)}}{Z} + \frac{\text{mass of other fissile nuclides}^1 \text{ in package (g)}}{Y} \right)
\]
where the values of Z and Y are taken from Table 13.
(iv) The CSI of any package does not exceed 10.
(c) Packages containing fissile material in any form provided that:
(i) The smallest external dimension of the package is not less than 10 cm;
(ii) The package, after being subjected to the tests specified in paras 719–724:
— Retains its fissile material contents;
— Preserves the minimum overall outside dimensions of the package to at least 10 cm;
— Prevents the entry of a 10 cm cube.
(iii) The CSI of the package is calculated using the following formula:
\[
CSI = 50 \times 2 \times \left( \frac{\text{mass of } U-235 \text{ in package (g)}}{Z} + \frac{\text{mass of other fissile nuclides}^2 \text{ in package (g)}}{Y} \right)
\]

---

1 Plutonium may be of any isotopic composition provided that the amount of Pu-241 is less than that of Pu-240 in the package.
where the values of Z and Y are taken from Table 13. The value of Z shall be that for 100% enriched uranium.

(iv) The maximum mass of fissile nuclides in any package does not exceed 15 g.
(d) The total mass of beryllium, hydrogenous material enriched in deuterium, graphite and other allotropic forms of carbon in an individual package shall not be greater than the mass of fissile nuclides in the package except where their total concentration does not exceed 1 g in any 1000 g of material. Beryllium incorporated in copper alloys up to 4% in weight of the alloy does not need to be considered.

**TABLE 13**

VALUES OF Y AND Z FOR CALCULATION OF CSI IN ACCORDANCE WITH PARA. 674

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uranium enriched up to 1.5% (Z)</td>
<td>2200</td>
</tr>
<tr>
<td>Uranium enriched up to 5% (Z)</td>
<td>850</td>
</tr>
<tr>
<td>Uranium enriched up to 10% (Z)</td>
<td>660</td>
</tr>
<tr>
<td>Uranium enriched up to 20% (Z)</td>
<td>580</td>
</tr>
<tr>
<td>Uranium enriched up to 100% (Z)</td>
<td>450</td>
</tr>
<tr>
<td>Other fissile nuclides (Y)</td>
<td>280</td>
</tr>
</tbody>
</table>

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

\[ b \] Plutonium may be of any isotopic composition provided that the amount of Pu-241 is less than that of Pu-240 in the package.

675. Packages containing not more than 1000 g of plutonium are excepted from the application of paras 676–686 provided that:

(a) Not more than 20% of the plutonium by mass is fissile nuclides;
(b) The CSI of the package is calculated using the following formula:

\[ CSI = 50 \times 2 \times \frac{\text{mass of plutonium (g)}}{1000} \]

(c) If uranium is present with the plutonium, the mass of uranium shall be no more than 1% of the mass of the plutonium.

Contents specification for assessments of package designs containing fissile material

676. Where the chemical or physical form, isotopic composition, mass or concentration, moderation ratio or density, or geometric configuration is not known, the assessments of paras 680–685 shall be performed assuming that each parameter that is not known has the value that gives the maximum neutron multiplication consistent with the known conditions and parameters in these assessments.

677. For irradiated nuclear fuel the assessments of paras 680–685 shall be based on an isotopic composition demonstrated to provide either:

(a) The maximum neutron multiplication during the irradiation history; or
(b) A conservative estimate of the neutron multiplication for the package assessments. After irradiation but prior to shipment, a measurement shall be performed to confirm the conservatism of the isotopic composition.

Geometry and temperature requirements

678. The package, after being subjected to the tests specified in paras 719–724, shall:

\[ 2 \] Plutonium may be of any isotopic composition provided that the amount of Pu-241 is less than that of Pu-240 in the package.
152

(a) Preserve the minimum overall outside dimensions of the package to at least 10 cm;
(b) Prevent the entry of a 10 cm cube

679. The package shall be designed for an ambient temperature range of $-40^\circ C$ to $+38^\circ C$ unless the competent authority specifies otherwise in the certificate of approval for the package design.

**Assessment of an individual package in isolation**

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

(a) Multiple high standard water barriers, not less than two of which would remain watertight if the package were subject to the tests prescribed in para. 685(b), a high degree of quality control in the manufacture, maintenance and repair of packagings, and tests to demonstrate the closure of each package before each shipment; or
(b) For packages containing uranium hexafluoride only, with maximum uranium enrichment of 5 mass per cent uranium-235:
   (i) Packages where, following the tests prescribed in para. 685(b), there is no physical contact between the valve and any other component of the packaging other than at its original point of attachment and where, in addition, following the test prescribed in para. 728 the valves remain leaktight;
   (ii) A high degree of quality control in the manufacture, maintenance and repair of packagings, coupled with tests to demonstrate closure of each package before each shipment.

681. It shall be assumed that the confinement system is closely reflected by at least 20 cm of water or such greater reflection as may additionally be provided by the surrounding material of the packaging. However, when it can be demonstrated that the confinement system remains within the packaging following the tests prescribed in para. 685(b), close reflection of the package by at least 20 cm of water may be assumed in para. 682(c).

682. The package shall be subcritical under the conditions of paras 680 and 681, and with the package conditions that result in the maximum neutron multiplication consistent with:

(a) Routine conditions of transport (incident free);
(b) The tests specified in para. 684(b);
(c) The tests specified in para. 685(b).

683. For packages to be transported by air:

(a) The package shall be subcritical under conditions consistent with the Type C package tests specified in para. 734 assuming reflection by at least 20 cm of water but no water in-leakage.
(b) In the assessment of para. 682 allowance shall not be made for special features of para. 680 unless, following the Type C package tests specified in para. 734 and, subsequently, the water in-leakage test of para. 733, leakage of water into or out of the void spaces is prevented.

**Assessment of package arrays under normal conditions of transport**
A number N shall be derived, such that five times N packages shall be subcritical for the arrangement and package conditions that provide the maximum neutron multiplication consistent with the following:
(a) There shall not be anything between the packages, and the package arrangement shall be reflected on all sides by at least 20 cm of water.
(b) The state of the packages shall be their assessed or demonstrated condition if they had been subjected to the tests specified in paras 719–724.

Assessment of package arrays under accident conditions of transport
A number N shall be derived, such that two times N packages shall be subcritical for the arrangement and package conditions that provide the maximum neutron multiplication consistent with the following:
(a) Hydrogenous moderation between the packages and the package arrangement reflected on all sides by at least 20 cm of water;
(b) The tests specified in paras 719–724 followed by whichever of the following is the more limiting:
(i) The tests specified in para. 727(b), and either para. 727(c) for packages having a mass not greater than 500 kg and an overall density not greater than 1000 kg/m$^3$ based on the external dimensions, or para. 727(a) for all other packages; followed by the test specified in para. 728 and completed by the tests specified in paras 731–733; or
(ii) The test specified in para. 729.
(c) Where any part of the fissile material escapes from the containment system following the tests specified in para. 685(b), it shall be assumed that fissile material escapes from each package in the array, and all of the fissile material shall be arranged in the configuration and moderation that results in the maximum neutron multiplication with close reflection by at least 20 cm of water.

Determination of criticality safety index for packages
The CSI for packages containing fissile material shall be obtained by dividing the number 50 by the smaller of the two values of N derived in paras 684 and 685 (i.e. CSI = 50/N). The value of the CSI may be zero, provided that an unlimited number of packages are subcritical (i.e. N is effectively equal to infinity in both cases).
701. Demonstration of compliance with the performance standards required in Section VI shall be accomplished by any of the following methods listed below or by a combination thereof:
(a) Performance of tests with specimens representing LSA-III material, or special form radioactive material, or low dispersible radioactive material, or with prototypes or samples of the packaging, where the contents of the specimen or the packaging for the tests shall simulate as closely as practicable the expected range of radioactive contents and the specimen or packaging to be tested shall be prepared as presented for transport.
(b) Reference to previous satisfactory demonstrations of a sufficiently similar nature;
(c) Performance of tests with models of appropriate scale, incorporating those features that are significant with respect to the item under investigation when engineering experience has shown the results of such tests to be suitable for design purposes. When a scale model is used, the need for adjusting certain test parameters, such as penetrator diameter or compressive load, shall be taken into account.
(d) Calculation, or reasoned argument, when the calculation procedures and parameters are generally agreed to be reliable or conservative.

702. After the specimen, prototype or sample has been subjected to the tests, appropriate methods of assessment shall be used to ensure that the requirements of this section have been fulfilled in compliance with the performance and acceptance standards prescribed in Section VI.

703. A solid material sample representing the entire contents of the package shall be immersed for 7 days in water at ambient temperature. The volume of water to be used in the test shall be sufficient to ensure that at the end of the 7 day test period, the free volume of the unabsorbed and unreacted water remaining shall be at least 10% of the volume of the solid test sample itself. The water shall have an initial pH of 6–8 and a maximum conductivity of 1 mS/m at 20°C. The total activity of the free volume of water shall be measured following the 7 day immersion of the test sample.

704. Specimens that comprise or simulate special form radioactive material shall be subjected to the impact test, the percussion test, the bending test and the heat test specified in paras 705–708. A different specimen may be used for each of the tests. Following each test, a leaching assessment or volumetric leakage test shall be performed on the specimen by a method no less sensitive than the methods given in para. 710 for indispersible solid material or in para. 711 for encapsulated material.

705. Impact test: The specimen shall drop onto the target from a height of 9 m. The target shall be as defined in para. 717.

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

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

708. Heat test: The specimen shall be heated in air to a temperature of 800°C and held at that temperature for a period of 10 min and shall then be allowed to cool.

709. Specimens that comprise or simulate radioactive material enclosed in a sealed capsule may be excepted from:
(a) The tests prescribed in paras 705 and 706 provided that the specimens are alternatively subjected to the impact test prescribed in the International Organization for Standardization document ISO 2919: Sealed Radioactive Sources — Classification [13]:
   (i) The Class 4 impact test if the mass of the special form radioactive material is less than 200 g;
   (ii) The Class 5 impact test if the mass of the special form radioactive material is more than 200 g but less than 500 g.
(b) The test prescribed in para. 708 provided the specimens are alternatively subjected to the Class 6 temperature test specified in ISO 2919 [13].

Leaching and volumetric leakage assessment methods
710. For specimens that comprise or simulate indispensible solid material, a leaching assessment shall be performed as follows:
(a) The specimen shall be immersed for 7 days in water at ambient temperature. The volume of water to be used in the test shall be sufficient to ensure that at the end of the 7 day test period the free volume of the unabsorbed and unreacted water remaining shall be at least 10% of the volume of the solid test sample itself. The water shall have an initial pH of 6–8 and a maximum conductivity of 1 mS/m at 20°C.
(b) The water with the specimen shall then be heated to a temperature of 50 ± 5 °C and maintained at this temperature for 4 h.
(c) The activity of the water shall then be determined.
(d) The specimen shall then be kept for at least 7 days in still air at not less than 30°C and with a relative humidity of not less than 90%.
(e) The specimen shall then be immersed in water of the same specification as in (a) and the water with the specimen heated to 50 ± 5 °C and maintained at this temperature for 4 h.
(f) The activity of the water shall then be determined.
711. For specimens that comprise or simulate radioactive material enclosed in a sealed capsule, either a leaching assessment or a volumetric leakage assessment shall be performed as follows:
(a) The leaching assessment shall consist of the following steps:
(i) The specimen shall be immersed in water at ambient temperature. The water shall have an initial pH of 6–8 with a maximum conductivity of 1 mS/m at 20°C.
(ii) The water and the specimen shall be heated to a temperature of 50 ± 5°C and maintained at this temperature for 4 h.
(iii) The activity of the water shall then be determined.
(iv) The specimen shall then be kept for at least 7 days in still air at not less than 30°C and with a relative humidity of not less than 90%.
(v) The process in (i), (ii) and (iii) shall be repeated.
(b) The alternative volumetric leakage assessment shall comprise any of the tests prescribed in the International Organization for Standardization document ISO 9978: Radiation Protection — Sealed Radioactive Sources — Leakage Test Methods [9] provided that they are acceptable to the competent authority.

TTTTT TESTS FOR LOW DISPERSIBLE RADIOACTIVE MATERIAL
712. A specimen that comprises or simulates low dispersible radioactive material shall be subjected to the enhanced thermal test specified in para. 736 and the impact test specified in para. 737. A different specimen may be used for each of the tests. Following each test, the specimen shall be subjected to the leach test specified in para. 703. After each test it shall be determined if the applicable requirements of para. 605 have been met.

UUUUU TESTS FOR PACKAGES
Preparation of a specimen for testing
713. All specimens shall be inspected before testing in order to identify and record faults or damage including the following:
(a) Divergence from the design;
(b) Defects in manufacture;
(c) Corrosion or other deterioration;
(d) Distortion of features.
714. The containment system of the package shall be clearly specified.
715. The external features of the specimen shall be clearly identified so that reference may be made simply and clearly to any part of such a specimen.

Testing the integrity of the containment system and shielding and assessing criticality safety
716. After each of the applicable tests specified in paras 718–737:
(a) Faults and damage shall be identified and recorded.
(b) It shall be determined whether the integrity of the containment system and shielding has been retained to the extent required in Section VI for the package under test.
(c) For packages containing fissile material, it shall be determined whether the assumptions and conditions used in the assessments required by paras 673–686 for one or more packages are valid.

Target for drop tests
The target for the drop test specified in paras 705, 722, 725(a), 727 and 735 shall be a flat, horizontal surface of such a character that any increase in its resistance to displacement or deformation upon impact by the specimen would not significantly increase damage to the specimen.

**Test for packagings designed to contain uranium hexafluoride**

Specimens that comprise or simulate *packagings* designed to contain 0.1 kg or more of uranium hexafluoride shall be tested hydraulically at an internal pressure of at least 1.38 MPa, but, when the test pressure is less than 2.76 MPa, the *design* shall require *multilateral approval*. For retesting *packagings*, any other equivalent non-destructive testing may be applied, subject to *multilateral approval*.

**Tests for demonstrating ability to withstand normal conditions of transport**

The tests are: the water spray test, the free drop test, the stacking test and the penetration test. Specimens of the *package* shall be subjected to the free drop test, the stacking test and the penetration test, preceded in each case by the water spray test. One specimen may be used for all the tests, provided that the requirements of para. 720 are fulfilled.

The time interval between the conclusion of the water spray test and the succeeding test shall be such that the water has soaked in to the maximum extent, without appreciable drying of the exterior of the specimen. In the absence of any evidence to the contrary, this interval shall be taken to be 2 h if the water spray is applied from four directions simultaneously. No time interval shall elapse, however, if the water spray is applied from each of the four directions consecutively.

Water spray test: The specimen shall be subjected to a water spray test that simulates exposure to rainfall of approximately 5 cm per hour for at least 1 h.

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

a) The height of drop measured from the lowest point of the specimen to the upper surface of the target shall be not less than the distance specified in Table 14 for the applicable mass. The target shall be as defined in para. 717.

b) For rectangular fibreboard or wood *packages* not exceeding a mass of 50 kg, a separate specimen shall be subjected to a free drop onto each corner from a height of 0.3 m.

c) For cylindrical fibreboard *packages* not exceeding a mass of 100 kg, a separate specimen shall be subjected to a free drop onto each of the quarters of each rim from a height of 0.3 m.

Stacking test: Unless the shape of the *packaging* effectively prevents stacking, the specimen shall be subjected, for a period of 24 h, to a compressive load equal to the greater of the following:

a) The equivalent of 5 times the maximum weight of the *package*;

b) The equivalent of 13 kPa multiplied by the vertically projected area of the *package*.

The load shall be applied uniformly to two opposite sides of the specimen, one of which shall be the base on which the *package* would typically rest.

Penetration test: The specimen shall be placed on a rigid, flat, horizontal surface that will not move significantly while the test is being carried out:
(a) A bar 3.2 cm in diameter with a hemispherical end and a mass of 6 kg shall be dropped and directed to fall, with its longitudinal axis vertical, onto the centre of the weakest part of the specimen, so that, if it penetrates sufficiently far, it will hit the containment system. The bar shall not be significantly deformed by the test performance.

(b) The height of drop of the bar measured from its lower end to the intended point of impact on the upper surface of the specimen shall be 1 m.

Additional tests for Type A packages designed for liquids and gases

725. A specimen, or separate specimens, shall be subjected to each of the following tests unless it can be demonstrated that one test is more severe for the specimen in question than the other, in which case one specimen shall be subjected to the more severe test:

(a) Free drop test: The specimen shall drop onto the target so as to suffer the maximum damage in respect of containment. The height of the drop measured from the lowest part of the specimen to the upper surface of the target shall be 9 m. The target shall be as defined in para. 717.

(b) Penetration test: The specimen shall be subjected to the test specified in para. 724, except that the height of the drop shall be increased to 1.7 m from the 1 m specified in para. 724(b).

TABLE 14. FREE DROP DISTANCE FOR TESTING PACKAGES TO NORMAL CONDITIONS OF TRANSPORT

<table>
<thead>
<tr>
<th>Package mass (kg)</th>
<th>Free drop distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package mass &lt; 5000</td>
<td>1.2</td>
</tr>
<tr>
<td>5000 &lt; package mass &lt; 10000</td>
<td>0.9</td>
</tr>
<tr>
<td>10000 &lt; package mass &lt; 15000</td>
<td>0.6</td>
</tr>
<tr>
<td>15000 &lt; package mass</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Tests for demonstrating ability to withstand accident conditions of transport

726. The specimen shall be subjected to the cumulative effects of the tests specified in paras 727 and 728, in that order. Following these tests, either this specimen or a separate specimen shall be subjected to the effect(s) of the water immersion test(s) as specified in para. 729 and, if applicable, para. 730.

727. Mechanical test: The mechanical test consists of three different drop tests. Each specimen shall be subjected to the applicable drops as specified in para. 659 or para. 685. The order in which the specimen is subjected to the drops shall be such that, on completion of the mechanical test, the specimen shall have suffered such damage as will lead to maximum damage in the thermal test that follows:

(a) For drop I, the specimen shall drop onto the target so as to suffer maximum damage, and the height of the drop measured from the lowest point of the specimen to the upper surface of the target shall be 9 m. The target shall be as defined in para. 717.

(b) For drop II, the specimen shall drop onto a bar rigidly mounted perpendicularly on the target so as to suffer maximum damage. The height of the drop measured from the intended point of impact of the specimen to the upper surface of the bar shall be 1 m. The bar shall be of solid mild steel of circular section, 15.0 ± 0.5 cm in diameter and 20 cm long unless a longer bar would cause greater damage, in which case a bar of sufficient
length to cause maximum damage shall be used. The upper end of the bar shall be flat and horizontal with its edge rounded off to a radius of not more than 6 mm. The target on which the bar is mounted shall be as described in para. 717.

(c) For drop III, the specimen shall be subjected to a dynamic crush test by positioning the specimen on the target so as to suffer maximum damage by the drop of a 500 kg mass from 9 m onto the specimen. The mass shall consist of a solid mild steel plate 1 m by 1 m and shall fall in a horizontal attitude. The lower face of the steel plate shall have its edges and corners rounded off to a radius of not more than 6 mm. The height of the drop shall be measured from the underside of the plate to the highest point of the specimen. The target on which the specimen rests shall be as defined in para. 717.

Thermal test: The specimen shall be in thermal equilibrium under conditions of an ambient temperature of 38°C, subject to the solar insolation conditions specified in Table 12 and subject to the design maximum rate of internal heat generation within the package from the radioactive contents. Alternatively, any of these parameters are allowed to have different values prior to and during the test, provided due account is taken of them in the subsequent assessment of package response. The thermal test shall then consist of (a) followed by (b).

(a) Exposure of a specimen for a period of 30 min to a thermal environment that provides a heat flux at least equivalent to that of a hydrocarbon fuel–air fire in sufficiently quiescent ambient conditions to give a minimum average flame emissivity coefficient of 0.9 and an average temperature of at least 800°C, fully engulfing the specimen, with a surface absorptivity coefficient of 0.8 or that value that the package may be demonstrated to possess if exposed to the fire specified.

(b) Exposure of the specimen to an ambient temperature of 38°C, subject to the solar insolation conditions specified in Table 12 and subject to the design maximum rate of internal heat generation within the package by the radioactive contents for a sufficient period to ensure that temperatures in the specimen are everywhere decreasing and/or are approaching initial steady state conditions. Alternatively, any of these parameters are allowed to have different values following cessation of heating, provided due account is taken of them in the subsequent assessment of package response. During and following the test, the specimen shall not be artificially cooled and any combustion of materials of the specimen shall be permitted to proceed naturally.

Water immersion test: The specimen shall be immersed under a head of water of at least 15 m for a period of not less than 8 h in the attitude that will lead to maximum damage. For demonstration purposes, an external gauge pressure of at least 150 kPa shall be considered to meet these conditions.

Enhanced water immersion test for Type B(U) and Type B(M) packages containing more than $10^5 A_2$ and Type C packages

Enhanced water immersion test: The specimen shall be immersed under a head of water of at least 200 m for a period of not less than 1 h. For demonstration purposes, an external gauge pressure of at least 2 MPa shall be considered to meet these conditions.

Water leakage test for packages containing fissile material

Packages for which water in-leakage or out-leakage to the extent that results in greatest reactivity has been assumed for purposes of assessment under paras 680–685 shall be excepted from the test.
Before the specimen is subjected to the water leakage test specified below, it shall be subjected to the tests in para. 727(b), and either para. 727(a) or 727(c), as required by para. 685 and the test specified in para. 728.

The specimen shall be immersed under a head of water of at least 0.9 m for a period of not less than 8 h and in the attitude for which maximum leakage is expected.

**Tests for Type C packages**

Specimens shall be subjected to the effects of each of the following test sequences in the orders specified:

(a) The tests specified in paras 727(a), 727(c), 735 and 736;
(b) The test specified in para. 737.

Separate specimens are allowed to be used for each of the sequences (a) and (b).

**Puncture-tearing test:** The specimen shall be subjected to the damaging effects of a vertical solid probe made of mild steel. The orientation of the package specimen and the impact point on the package surface shall be such as to cause maximum damage at the conclusion of the test sequence specified in para. 734(a):

(a) The specimen, representing a package having a mass of less than 250 kg, shall be placed on a target and subjected to a probe having a mass of 250 kg falling from a height of 3 m above the intended impact point. For this test the probe shall be a 20 cm diameter cylindrical bar with the striking end forming the frustum of a right circular cone with the following dimensions: 30 cm height and 2.5 cm diameter at the top with its edge rounded off to a radius of not more than 6 mm. The target on which the specimen is placed shall be as specified in para. 717.

(b) For packages having a mass of 250 kg or more, the base of the probe shall be placed on a target and the specimen dropped onto the probe. The height of the drop, measured from the point of impact with the specimen to the upper surface of the probe, shall be 3 m. For this test the probe shall have the same properties and dimensions as specified in (a), except that the length and mass of the probe shall be such as to cause maximum damage to the specimen. The target on which the base of the probe is placed shall be as specified in para. 717.

**Enhanced thermal test:** The conditions for this test shall be as specified in para. 728, except that the exposure to the thermal environment shall be for a period of 60 min.

**Impact test:** The specimen shall be subject to an impact on a target at a velocity of not less than 90 m/s, at such an orientation as to suffer maximum damage. The target shall be as defined in para. 717, except that the target surface may be at any orientation as long as the surface is normal to the specimen path.
Section VIII

APPROVAL AND ADMINISTRATIVE REQUIREMENTS

GENERAL

801. For package designs where it is not required that a competent authority issue a certificate of approval, the consignor shall, on request, make available for inspection by the relevant competent authority, documentary evidence of the compliance of the package design with all the applicable requirements.

802. Competent authority approval shall be required for the following:

(a) Designs for:
   (i) Special form radioactive material (see paras 803, 804 and 822823);
   (ii) Low dispersible radioactive material (see paras 803 and 804);
   (iii) Fissile material excepted under para. 417(f) (see paras 805 and 806);
   (iv) Packages containing 0.1 kg or more of uranium hexafluoride (see para. 807);
   (v) Packages containing fissile material unless excepted by para. 417, 674 or 675 (see paras 814–816 and 818–820);
   (vi) Type B(U) packages and Type B(M) packages (see paras 808–813 and 818–820);
   (vii) Type C packages (see paras 808–810).

(b) Special arrangements (see paras 82829–830831);

(c) Certain shipments (see paras 824825–827828);

(d) Radiation protection programme for special use vessels (see para. 576(a));

(e) Calculation of radionuclide values that are not listed in Table 2 (see para. 403(a)).

(f) Calculation of alternative activity limits for an exempt consignment of instruments or articles (see para. 403(b)).

Calculation of alternative activity limits for an exempt consignment of instruments and articles containing T(H-3), Kr-85, Th-228 or Th-232 (see footnote (h) in Table 2).

The certificates of approval for the package design and the shipment may be combined into a single certificate.

APPROVAL OF SPECIAL FORM RADIOACTIVE MATERIAL AND LOW DISPERSIBLE RADIOACTIVE MATERIAL

803. The design for special form radioactive material shall require unilateral approval. The design for low dispersible radioactive material shall require multilateral approval. In both cases, an application for approval shall include:

(a) A detailed description of the radioactive material or, if a capsule, the contents; particular reference shall be made to both physical and chemical states;

(b) A detailed statement of the design of any capsule to be used;

(c) A statement of the tests that have been done and their results, or evidence based on calculative methods to show that the radioactive material is capable of meeting the performance standards, or other evidence that the special form radioactive material or

1 Although this publication is identified as a new edition, there are no changes that affect the administrative and approval requirements in respect of radioactive material and packages approved under the previous editions, amendments or revisions since the 1996 Edition.
low dispersible radioactive material meets the applicable requirements of these Regulations;
(d) A specification of the applicable management system as required in para. 306;
(e) Any proposed pre-shipment actions for use in the consignment of special form radioactive material or low dispersible radioactive material.

804. The competent authority shall establish a certificate of approval stating that the approved design meets the requirements for special form radioactive material or low dispersible radioactive material and shall attribute to that design an identification mark.

(zzzzz) APPROVAL of other MATERIAL FOR EXCEPTION EXCEPTed FROM FISSILE CLASSIFICATION AS FISSILE

805. The design for a fissile material excepted from classification as FISSILE classification in accordance with Table 1, under para. 417(f) shall require multilateral approval. An application for approval shall include:
(a) A detailed description of the material; particular reference shall be made to both physical and chemical states.
(b) A statement of the tests that have been done and their results, or evidence based on calculation methods to show that the material is capable of meeting the requirements specified in para. 606;
(c) A specification of the applicable management system as required in para. 306;
(d) A statement of specific actions to be taken prior to shipment.

806. The competent authority shall establish a certificate of approval stating that the approved material meets the requirements for fissile material excepted by the competent authority in accordance with para. 606 and shall attribute to that design an identification mark.

(aaaaaa) APPROVAL OF PACKAGE DESIGNS

Approval of package designs to contain uranium hexafluoride

807. The approval of designs for packages containing 0.1 kg or more of uranium hexafluoride requires that:
(a) Each design that meets the requirements of para. 634 shall require multilateral approval.
(b) Each design that meets the requirements of paras 631–633 shall require unilateral approval by the competent authority of the country of origin of the design, unless multilateral approval is otherwise required by these Regulations.
(c) The application for approval shall include all information necessary to satisfy the competent authority that the design meets the requirements of para. 631, and a specification of the applicable management system as required in para. 306.
(d) The competent authority shall establish a certificate of approval stating that the approved design meets the requirements of para. 631 and shall attribute to that design an identification mark.

(bbbbbb) Approval of Type B(U) and Type C package designs

808. Each Type B(U) and Type C package design shall require unilateral approval, except that:
(a) A package design for fissile material, which is also subject to paras 814–816, shall require multilateral approval.
(b) A Type B(U) package design for low dispersible radioactive material shall require multilateral approval.

809. An application for approval shall include:
(a) A detailed description of the proposed radioactive contents with reference to their physical and chemical states and the nature of the radiation emitted;
(b) A detailed statement of the design, including complete engineering drawings and schedules of materials and methods of manufacture;
(c) A statement of the tests that have been carried out and their results, or evidence based on calculative methods or other evidence that the design is adequate to meet the applicable requirements;
(d) The proposed operating and maintenance instructions for the use of the packaging;
(e) If the package is designed to have a maximum normal operating pressure in excess of 100 kPa gauge, a specification of the materials of manufacture of the containment system, the samples to be taken, and the tests to be made.
(f) Where the proposed radioactive contents are irradiated nuclear fuel, the applicant shall state and justify any assumption in the safety analysis relating to the characteristics of the fuel and describe any pre-shipment measurement required by para. 677(b).
(g) Any special stowage provisions necessary to ensure the safe dissipation of heat from the package considering the various modes of transport to be used and the type of conveyance or freight container;
(h) A reproducible illustration, not larger than 21 cm × 30 cm, showing the make-up of the package;
(i) A specification of the applicable management system as required in para. 306.

810. The competent authority shall establish a certificate of approval stating that the approved design meets the requirements for Type B(U) or Type C packages and shall attribute to that design an identification mark.

Approval of Type B(M) package designs
811. Each Type B(M) package design, including those for fissile material which are also subject to paras 814–816 and those for low dispersible radioactive material, shall require multilateral approval.

812. An application for approval of a Type B(M) package design shall include, in addition to the information required in para. 809 for Type B(U) packages:
(a) A list of the requirements specified in paras 639, 655–657 and 660–666 with which the package does not conform;
(b) Any proposed supplementary operational controls to be applied during transport not regularly provided for in these Regulations, but which are necessary to ensure the safety of the package or to compensate for the deficiencies listed in (a);
(c) A statement relative to any restrictions on the mode of transport and to any special loading, carriage, unloading or handling procedures;
(d) A statement of the range of ambient conditions (temperature, solar radiation) that are expected to be encountered during transport and which have been taken into account in the design.
813. The competent authority shall establish a certificate of approval stating that the approved design meets the applicable requirements for Type B(M) packages and shall attribute to that design an identification mark.

**Approval of package designs to contain fissile material**

814. Each package design for fissile material, that is not excepted by any of paras 417 (a)-(e), 674 and 675 shall require multilateral approval.

815. An application for approval shall include all information necessary to satisfy the competent authority that the design meets the requirements of para. 673, and a specification of the applicable management system as required in para. 306.

816. The competent authority shall establish a certificate of approval stating that the approved design meets the requirements of para. 673 and shall attribute to that design an identification mark.

(cccccc) **APPROVAL OF ALTERNATIVE ACTIVITY LIMITS FOR AN EXEMPT CONSIGNMENT OF INSTRUMENTS OR ARTICLES**

817. Alternative activity limits for an exempt consignment of instruments or articles in accordance with para. 403(b) shall require multilateral approval. An application for approval shall include:

(a) An identification and detailed description of the instrument or article, its intended uses and the radionuclide(s) incorporated. [TS-G-1.1 – guidance referring to justification to remain]

(b) The maximum activity of the radionuclide(s) in the instrument or article.

(c) Maximum external radiation levels arising from the instrument or article.

(d) The chemical and physical forms of the radionuclide(s) contained in the instrument or article.

(e) Details of the construction and design of the instrument or article, particularly as related to the containment and shielding of the radionuclide in routine, normal and accident conditions of transport.

(f) The applicable management system, including the quality testing and verification procedures to be applied to radioactive sources, components and finished products to ensure that the maximum specified activity of radioactive material or the maximum radiation levels specified for the instrument or article are not exceeded, and that the instruments or articles are constructed according to the design specifications.

(g) The maximum number of instruments or articles expected to be shipped per consignment and annually.

(h) Dose assessments in accordance with the principles and methodologies set out in the BSS, including individual doses to transport workers and members of the public and, if appropriate, collective doses arising from routine, normal and accident conditions of transport, based on representative transport scenarios the consignments are subject to.

818. The competent authority shall establish a certificate of approval stating that the approved alternative activity limit for an exempt consignment of instruments or articles meets the requirements of para. 403(b) and shall attribute to that certificate an identification mark.

(dddddd) **TRANSITIONAL ARRANGEMENTS**
Packages not requiring competent authority approval of design under the 1985 and 1985 (As Amended 1990) Editions of these Regulations

817819. Packages not requiring competent authority approval of design (Excepted packages, Type IP-1, Type IP-2, Type IP-3 and Type A packages) shall meet this Edition of these Regulations in full, except that packages that meet the requirements of the 1985 or 1985 (As Amended 1990) Editions of these Regulations:

(a) May continue in transport provided that they were prepared for transport prior to 31 December 2003, and subject to the requirements of para. 821822, if applicable;
(b) May continue to be used provided that:
   (i) They were not designed to contain UF₆.
   (ii) The applicable requirements of para. 306 of this Edition of these Regulations are applied.
   (iii) The activity limits and classification in Section IV of this Edition of these Regulations are applied.
   (iv) The requirements and controls for transport in Section V of this Edition of these Regulations are applied.
   (v) The packaging was not manufactured or modified after 31 December 2003.

Packages approved under the 1973, 1973 (As Amended), 1985 and 1985 (As Amended 1990) Editions of these Regulations

818820. Packages requiring competent authority approval of the design shall meet this Edition of these Regulations in full unless the following conditions are met:

(a) The packagings were manufactured to a package design approved by the competent authority under the provisions of the 1973 or 1973 (As Amended) or the 1985 or 1985 (As Amended 1990) Editions of these Regulations.
(b) The package design is subject to multilateral approval.
(c) The applicable requirements of para. 306 of this Edition of these Regulations are applied.
(d) The activity limits and classification in Section IV of this Edition of these Regulations are applied.
(e) The requirements and controls for transport in Section V of this Edition of these Regulations are applied.
(f) For a package containing fissile material and transported by air, the requirement of para. 683 is met.
(g) For packages that meet the requirements of the 1973 or 1973 (As Amended) Editions of these Regulations:
   (i) The packages retain sufficient shielding to ensure that the radiation level at 1 m from the surface of the package would not exceed 10 mSv/h in the accident conditions of transport defined in the 1973 Revised or 1973 Revised (As Amended) Editions of these Regulations with the maximum radioactive contents which the package is authorized to contain.
   (ii) The packages do not utilize continuous venting.
   (iii) A serial number in accordance with the provision of para. 535 is assigned to and marked on the outside of each packaging.
(h) The package design has not been modified after the date of enforcement of the edition of the Regulations that followed the one under which the package was approved, unless to improve safety.

819821. No new manufacture of packagings to a package design meeting the provisions of the 1973, 1973 (As Amended), 1985, and 1985 (As Amended 1990) Editions of these Regulations shall be permitted to commence. Packagings manufactured to a package design approved by the competent authority under the provisions of the 1973 or 1973 (As Amended) Editions of these Regulations and whose manufacture began after 31 December 1995 shall meet this Edition of the Regulations in full.

820. Packagings manufactured to a package design approved by the competent authority under the provisions of the 1985 or 1985 (As Amended 1990) Editions of these Regulations and whose manufacture began after 31 December 2006 shall meet this Edition of the Regulations in full.

Packages excepted from the requirements for fissile materials under the 2009 and earlier Editions of these Regulations

821822. Packages containing fissile material that are excepted from classification as FISSILE according to para. 417(a)(i) or (iii) of the 2009 Edition of these Regulations did not require approval of design by the competent authority and that were prepared for transport before 31 December 2014 may continue in transport and may continue to be classified as non-fissile or fissile-excepted except that the consignment limits in Table 4 of the 2009 Edition of these Regulations shall apply to the conveyance. The consignment shall be transported under exclusive use.

either:
By applying para. 560 (a), (b) or (d) of the 1985 or 1985 (As Amended 1990) Edition of these Regulations; or
By applying para. 672 (a)(i) or (iii) of the 1996 or 2005 Edition of these Regulations or para. 417 (a)(i) or (iii) of the 2009 Edition of these Regulations before xxdatexx may continue in transport and may continue to be classified as non-fissile or fissile-excepted under para. 417(a)(i) or (iii) of the 2009 Edition of these Regulations, except that the consignment limits in Table 4 of the 2009 Edition of these Regulations shall apply to the conveyance. The consignment shall be transported under exclusive use and subject to multilateral approval of shipment.

Special form radioactive material approved under the 1973, 1973 (As Amended), 1985 and 1985 (As Amended 1990) Editions of these Regulations

822823. Special form radioactive material manufactured to a design that had received unilateral approval by the competent authority under the 1973, 1973 (As Amended), 1985 or 1985 (As Amended 1990) Editions of these Regulations may continue to be used when in compliance with the mandatory management system in accordance with the applicable requirements of para. 306. No new manufacture of such special form radioactive material shall be permitted to commence.

 notifying and registration of serial numbers

823824. The competent authority shall be informed of the serial number of each packaging manufactured to a design approved under paras 808, 811, 814, and 818820.

approval of shipments

824825. Multilateral approval shall be required for:
(a) The shipment of Type B(M) packages not conforming with the requirements of para. 639 or designed to allow controlled intermittent venting;
(b) The shipment of Type B(M) packages containing radioactive material with an activity greater than 3000 $A_1$ or 3000 $A_2$, as appropriate, or 1000 TBq, whichever is the lower;
(c) The shipment of packages containing fissile materials if the sum of the CSIs of the packages in a single freight container or in a single conveyance exceeds 50. Excluded from this requirement shall be shipments by seagoing vessels, if the sum of the CSIs does not exceed 50 for any hold, compartment or defined deck area and the distance of 6 m between groups of packages or overpacks as required in Table 11 is met.
(d) The shipment of packages containing fissile material under the provisions of transitional arrangements in accordance with para. 821823822;
(e) Radiation protection programmes for shipments by special use vessels in accordance with para. 576(a).

825826. A competent authority may authorize transport through or into its country without shipment approval, by a specific provision in its design approval.

826827. An application for approval of shipment shall include:
(a) The period of time, related to the shipment, for which the approval is sought;
(b) The actual radioactive contents, the expected modes of transport, the type of conveyance and the probable or proposed route;
(c) The details of how the precautions and administrative or operational controls, referred to in the certificates of approval for the package designs, if applicable, issued under paras 810, 813 and 816, are to be put into effect.

827828. Upon approval of the shipment, the competent authority shall issue a certificate of approval.

(gggggg) APPROVAL for SHIPMENTS UNDER SPECIAL ARRANGEMENT

828829. Each consignment transported under special arrangement shall require multilateral approval.

829830. An application for approval of shipments under special arrangement shall include all the information necessary to satisfy the competent authority that the overall level of safety in transport is at least equivalent to that that would be provided if all the applicable requirements of these Regulations had been met. The application shall also include:
(a) A statement of the respects in which, and of the reasons why, the shipment cannot be made in full accordance with the applicable requirements;
(b) A statement of any special precautions or special administrative or operational controls that are to be employed during transport to compensate for the failure to meet the applicable requirements.

830831. Upon approval of shipments under special arrangement, the competent authority shall issue a certificate of approval.

(hhhhhh) COMPETENT AUTHORITY certificates of approval

Competent authority identification marks

831832. Each certificate of approval issued by a competent authority shall be assigned an identification mark. The mark shall be of the following generalized type: VRI/Number/Type Code
(a) Except as provided in para. 832833(b), VRI represents the international vehicle registration identification code of the country issuing the certificate.

(b) The number shall be assigned by the competent authority and shall be unique and specific with regard to the particular design, shipment or alternative activity limit for exempt consignment. The identification mark of the approval of shipment shall be clearly related to the identification mark of the approval of design.

(c) The following type codes shall be used in the order listed to indicate the types of certificate of approval issued:

- AF Type A package design for fissile material
- B(U) Type B(U) package design (B(U)F if for fissile material)
- B(M) Type B(M) package design (B(M)F if for fissile material)
- C Type C package design (CF if for fissile material)
- IF Industrial package design for fissile material
- S Special form radioactive material
- LD Low dispersible radioactive material
- FE Fissile material that requires multilateral approval to be excepted from classification as FISSILE, in accordance with Table 1 complying with the requirements of para. 606

(d) For certificates of approval of package design and special form radioactive material, other than those issued under the provisions of paras 818820–822823, and for certificates of approval of low dispersible radioactive material, the symbol “-96” shall be added to the type code.

832833 These identification marks shall be applied as follows:

(a) Each certificate and each package shall bear the appropriate identification mark, comprising the symbols prescribed in paras 831832(a)-(d), except that, for packages, only the applicable design type codes including, if applicable, the symbol ‘-96’ shall appear following the second stroke, that is, the “T” or “X” shall not appear in the identification marking on the package. Where the approval of design and the approval of shipment are combined, the applicable type codes do not need to be repeated. For example:

- A/132/B(M)F-96: A Type B(M) package design approved for fissile material, requiring multilateral approval, for which the competent authority of Austria has assigned the design number 132 (to be marked both on the package and on the certificate of approval for the package design)
- A/132/B(M)F-96T: The approval of shipment issued for a package bearing the identification mark elaborated above (to be marked on the certificate only)
- A/137/X: An approval of special arrangement issued by the competent authority of Austria, to which the number 137 has been assigned (to be marked on the certificate only).
A/139/IF-96: An industrial package design for fissile material approved by the competent authority of Austria, to which package design number 139 has been assigned (to be marked both on the package and on the certificate of approval for the package design)

A/145/H(U)-96: A package design for fissile excepted uranium hexafluoride approved by the competent authority of Austria, to which package design number 145 has been assigned (to be marked both on the package and on the certificate of approval for the package design)

(b) Where multilateral approval is effected by validation in accordance with para. 838840, only the identification mark issued by the country of origin of the design or shipment shall be used. Where multilateral approval is effected by issue of certificates by successive countries, each certificate shall bear the appropriate identification mark, and the package whose design was so approved shall bear all appropriate identification marks.

For example:
A/132/B(M)F-96
CH/28/B(M)F-96

would be the identification mark of a package that was originally approved by Austria and was subsequently approved, by separate certificate, by Switzerland. Additional identification marks would be tabulated in a similar manner on the package.

(c) The revision of a certificate shall be indicated by a parenthetical expression following the identification mark on the certificate. For example, A/132/B(M)F-96(Rev.2) would indicate revision 2 of the Austrian certificate of approval for the package design; or A/132/B(M)F-96(Rev.0) would indicate the original issuance of the Austrian certificate of approval for the package design. For original issuances, the parenthetical entry is optional and other words such as “original issuance” may also be used in place of “Rev.0”. Certificate revision numbers may only be issued by the country issuing the original certificate of approval.

(d) Additional symbols (as may be necessitated by national requirements) may be added in brackets to the end of the identification mark, for example, A/132/B(M)F-96(SP503).

(e) It is not necessary to alter the identification mark on the packaging each time that a revision to the design certificate is made. Such re-marking shall be required only in those cases where the revision to the package design certificate involves a change in the letter type codes for the package design following the second stroke.

(iiiii) CONTENTS OF CERTIFICATES of APPROVAL

Certificate of approval of special form radioactive material and of low dispersible radioactive material

833834. Each certificate of approval issued by a competent authority for special form radioactive material or low dispersible radioactive material shall include the following information:

(a) Type of certificate;

(b) The competent authority identification mark;

(c) The issue date and an expiry date;
(d) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the special form radioactive material or low dispersible radioactive material is approved;
(e) The identification of the special form radioactive material or low dispersible radioactive material;
(f) A description of the special form radioactive material or low dispersible radioactive material;
(g) Design specifications for the special form radioactive material or low dispersible radioactive material, which may include references to drawings;
(h) A specification of the radioactive contents that includes the activities involved and which may include the physical and chemical forms;
(i) A specification of the applicable management system as required in para. 306;
(j) Reference to information provided by the applicant relating to specific actions to be taken prior to shipment;
(k) If deemed appropriate by the competent authority, reference to the identity of the applicant;
(l) Signature and identification of the certifying official.

Certificates for fissile material excepted by the competent authority
834835. Each certificate of approval issued by a competent authority for exception of fissile material shall include the following information:
(a) Type of certificate;
(b) The competent authority identification mark;
(c) The issue date and an expiry date;
(d) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the exception is approved;
(e) A description of the excepted material;
(f) Limiting specifications for the excepted material;
(g) A specification of the applicable management system as required in para. 306;
(h) Reference to information provided by the applicant relating to specific actions to be taken prior to shipment;
(i) If deemed appropriate by the competent authority, reference to the identity of the applicant;
(j) Signature and identification of the certifying official;
(k) Reference to documentation that demonstrates compliance with para 606.

Certificates of approval of special arrangement
835836. Each certificate of approval issued by a competent authority for a special arrangement shall include the following information:
(a) Type of certificate;
(b) The competent authority identification mark;
(c) The issue date and an expiry date;
(d) Mode(s) of transport;
(e) Any restrictions on the modes of transport, type of conveyance, freight container, and any necessary routeing instructions;
(f) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the special arrangement is approved;
(g) The following statement: “This certificate does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported”;
(h) References to certificates for alternative radioactive contents, other competent authority validation, or additional technical data or information, as deemed appropriate by the competent authority;
(i) Description of the packaging by reference to the drawings or a specification of the design. If deemed appropriate by the competent authority, a reproducible illustration not larger than 21 cm × 30 cm, showing the make-up of the package, should also be provided, accompanied by a brief description of the packaging, including materials of manufacture, gross mass, general external dimensions and appearance;
(j) A specification of the authorized radioactive contents, including any restrictions on the radioactive contents that might not be obvious from the nature of the packaging. This shall include the physical and chemical forms, the activities involved (including those of the various isotopes, if appropriate), mass in grams (for fissile material or for each fissile nuclide, when appropriate) and whether special form radioactive material, low dispersible radioactive material or fissile material excepted under para. 417(f), if applicable;
(k) Additionally, for packages containing fissile material:
   (i) A detailed description of the authorized radioactive contents.
   (ii) The value of the CSI.
   (iii) Reference to the documentation that demonstrates the criticality safety of the contents;
   (iv) Any special features on the basis of which the absence of water from certain void spaces has been assumed in the criticality assessment;
   (v) Any allowance (based on para. 677(b)) for a change in neutron multiplication assumed in the criticality assessment as a result of actual irradiation experience;
   (vi) The ambient temperature range for which the special arrangement has been approved.
(l) A detailed listing of any supplementary operational controls required for preparation, loading, carriage, unloading and handling of the consignment, including any special stowage provisions for the safe dissipation of heat;
(m) If deemed appropriate by the competent authority, reasons for the special arrangement;
(n) Description of the compensatory measures to be applied as a result of the shipment being under special arrangement;
(o) Reference to information provided by the applicant relating to the use of the packaging or specific actions to be taken prior to the shipment;
(p) A statement regarding the ambient conditions assumed for purposes of design if these are not in accordance with those specified in paras 656, 657 and 666, as applicable;
(q) Any emergency arrangements deemed necessary by the competent authority;
(r) A specification of the applicable management system as required in para. 306;
(s) If deemed appropriate by the competent authority, reference to the identity of the applicant and to the identity of the carrier;
(t) Signature and identification of the certifying official.

Certificates of Shipment approval
836837. Each certificate of approval for a shipment issued by a competent authority shall include the following information:
(a) Type of certificate;
(b) The competent authority identification mark(s);
(c) The issue date and an expiry date;
(d) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the shipment is approved;
(e) Any restrictions on the modes of transport, type of conveyance, freight container, and any necessary routeing instructions;
(f) The following statement: “This certificate does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported.”;
(g) A detailed listing of any supplementary operational controls required for preparation, loading, carriage, unloading and handling of the consignment, including any special stowage provisions for the safe dissipation of heat or maintenance of criticality safety;
(h) Reference to information provided by the applicant relating to specific actions to be taken prior to shipment;
(i) Reference to the applicable certificate(s) of approval of design;
(j) A specification of the actual radioactive contents, including any restrictions on the radioactive contents that might not be obvious from the nature of the packaging. This shall include the physical and chemical forms, the total activities involved (including those of the various isotopes, if appropriate), mass in grams (for fissile material or for each fissile nuclide, when appropriate), and whether special form radioactive material, low dispersible radioactive material, fissile material excepted under para. 417(f), or fissile material transported under the provisions of transitional arrangements in accordance with para. 821823822, if applicable;
(k) Any emergency arrangements deemed necessary by the competent authority;
(l) A specification of the applicable management system as required in para. 306;
(m) If deemed appropriate by the competent authority, reference to the identity of the applicant;
(n) Signature and identification of the certifying official.

Certificates of approval of package design
837838. Each certificate of approval of the design of a package issued by a competent authority shall include the following information:
(a) Type of certificate;
(b) The competent authority identification mark;
(c) The issue date and an expiry date;
(d) Any restriction on the modes of transport, if appropriate;
(e) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the design is approved;
(f) The following statement: “This certificate does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported”;
(g) References to certificates for alternative radioactive contents, other competent authority validation, or additional technical data or information, as deemed appropriate by the competent authority;
(h) A statement authorizing shipment where approval of shipment is required under para. 824825, if deemed appropriate;
(i) Identification of the packaging;
(j) Description of the packaging by reference to the drawings or specification of the design. If deemed appropriate by the competent authority, a reproducible illustration not larger than 21 cm × 30 cm, showing the make-up of the package, should also be provided, accompanied by a brief description of the packaging, including materials of manufacture, gross mass, general external dimensions and appearance;
(k) Specification of the design by reference to the drawings;
(l) A specification of the authorized radioactive contents, including any restrictions on the radioactive contents that might not be obvious from the nature of the packaging. This shall include the physical and chemical forms, the activities involved (including those of the various isotopes, if appropriate), the mass in grams (for fissile material, the total mass of fissile nuclides or the mass for each fissile nuclide, when appropriate), and whether special form radioactive material, low dispersible radioactive material or fissile material excepted under para. 417(f), if applicable;
(m) A description of the containment system;
(n) For package designs containing fissile material that require multilateral approval of the package design in accordance with para. 814:
(i) A detailed description of the authorized radioactive contents;
(ii) A description of the confinement system;
(iii) The value of the CSI;
(iv) Reference to the documentation that demonstrates the criticality safety of the contents;
(v) Any special features on the basis of which the absence of water from certain void spaces has been assumed in the criticality assessment;
(vi) Any allowance (based on para. 677(b)) for a change in neutron multiplication assumed in the criticality assessment as a result of actual irradiation experience;
(vii) The ambient temperature range for which the package design has been approved.
(o) For Type B(M) packages, a statement specifying those prescriptions of paras 639, 655–657 and 660–666 with which the package does not conform and any amplifying information that may be useful to other competent authorities;
(p) For packages containing more than 0.1 kg of uranium hexafluoride, a statement specifying those prescriptions of para. 634 that apply, if any, and any amplifying information that may be useful to other competent authorities;
(q) A detailed listing of any supplementary operational controls required for preparation, loading, carriage, unloading and handling of the consignment, including any special stowage provisions for the safe dissipation of heat;
(r) Reference to information provided by the applicant relating to the use of the packaging or to specific actions to be taken prior to shipment;
(s) A statement regarding the ambient conditions assumed for purposes of design if these are not in accordance with those specified in paras 656, 657 and 666, as applicable;
(t) A specification of the applicable management system as required in para. 306;
(u) Any emergency arrangements deemed necessary by the competent authority;
(v) If deemed appropriate by the competent authority, reference to the identity of the applicant;
(w) Signature and identification of the certifying official.

Certificates for alternative activity limits for an exempt consignment of instruments or articles

839. Each certificate issued by a competent authority for alternative activity limits for an exempt consignment of instruments or articles according to para. 818 shall include the following information:
(a) Type of certificate
(b) The competent authority identification mark.
(c) The issue date and an expiry date.
(d) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the exemption is approved.
(e) The identification of the instrument or article
(f) A description of the instrument or article
(g) Design specifications for the instrument or article
(h) A specification of the radionuclide(s), the approved alternative activity limit(s) for the exempt consignment(s) of the instrument(s) or article(s).
(i) Reference to documentation that demonstrates compliance with para. 403(b).
(j) If deemed appropriate by the competent authority, reference to the identity of the applicant.
(k) Signature and identification of the certifying official.

VALIDATION OF CERTIFICATES

838840. Multilateral approval may be by validation of the original certificate issued by the competent authority of the country of origin of the design or shipment. Such validation may take the form of an endorsement on the original certificate or the issuance of a separate endorsement, annex, supplement, etc., by the competent authority of the country through or into which the shipment is made.
REFERENCES

References are to editions that are current as of the time of publication of these Regulations. Editions that supersede these may be adopted under national legislation.


[12] INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, Nuclear
Energy — Packaging of Uranium Hexafluoride (UF₆) for Transport, ISO 7195:2005(E),

[13] INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, Radiation
Protection — Sealed Radioactive Sources — General Requirements and Classification,
Annex I
SUMMARY OF APPROVAL AND PRIOR NOTIFICATION REQUIREMENTS
This summary reflects the contents of the Regulations for the Safe Transport of Radioactive Material (20XX Edition). The user’s attention is called to the fact that there may be deviations (exceptions, additions, etc.) relative to:
(a) National regulations relating to safety;
(b) Carrier restrictions; and
(c) National regulations relating to security, physical protection, liability, insurance, pre-notification and/or routeing and import/export/transit licensing.\(^1\)

\(^1\) In particular, additional measures are taken to provide appropriate physical protection in the transport of nuclear material and to prevent acts without lawful authority that constitute the receipt, possession, use, transfer, alteration, disposal or dispersal of nuclear material and which cause or are likely to cause death or serious injury to any person or substantial damage to property (see Refs I-1 to I-6).

ANNEX I: SUMMARY OF APPROVAL AND PRIOR NOTIFICATION REQUIREMENTS (Part 1)

<table>
<thead>
<tr>
<th>Key paragraphs in the Regulations</th>
<th>Class of package or material</th>
<th>Competent authority approval required</th>
<th>Consignor required to notify country of origin and countries en route (^a) of each shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Country of origin</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Countries en route (^a)</td>
<td></td>
</tr>
<tr>
<td>Exected package (^a, e)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>LSA material (^b, c, e) and SCO (^c, e)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>– Type IP-1,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Type IP-2 or</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>– Type IP-3</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Type A (^b, n, e)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

\(^a\) Countries through or into which (but not over which) the consignment is transported (see para. 204 of the Regulations).
b If the **radioactive contents** are uranium hexafluoride in quantities of 0.1 kg or more, the approval requirements for **packages** containing it shall additionally apply (see paras 802 and 807 of the Regulations).

c If the **radioactive contents** are **fissile material** that is not excepted from the requirements for **packages** containing **fissile material**, then the approval requirements in paras 814 and 824 823825 of the Regulations shall additionally apply.

d For international transport by post the *consignment* shall be deposited with the postal service only by *consignors* authorized by the national authority.

e If the **radioactive contents** are **fissile material** excepted under para. 417(f) of the Regulations, *multilateral approval* shall be required (see para. 805 of the Regulations).

**ANNEX I: SUMMARY OF APPROVAL AND PRIOR NOTIFICATION REQUIREMENTS (Part 2)**

<table>
<thead>
<tr>
<th>Key paragraphs in the Regulations</th>
<th>Class of package Or material</th>
<th>Competent authority approval required</th>
<th>Consignor required to notify country of origin and countries en route of each shipment</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td>Country of origin</td>
<td>Countries en route a</td>
</tr>
<tr>
<td><strong>Type B(U)</strong> b, c, e:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>808, 824823825, 557, 558</td>
<td>– Package design</td>
<td>Yes</td>
<td>No d</td>
</tr>
<tr>
<td></td>
<td>– Shipment</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Type B(M)</strong> b, c, e:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>811, 824823825, 557, 558</td>
<td>– Package design</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>– Shipment</td>
<td>(see Note 3)</td>
<td>(see Note 3)</td>
</tr>
<tr>
<td><strong>Type C</strong> b, c, e:</td>
<td></td>
<td></td>
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<tr>
<td>808, 824823825, 557, 558</td>
<td>– Package design</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>– Shipment</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

a Countries *through or into* which (but not over which) the *consignment* is transported (see para. 204 of the Regulations).

b If the **radioactive contents** are **fissile material** that is not excepted from the requirements for **packages** containing **fissile material**, then the approval requirements in paras 814 and 824 823825 of the Regulations shall additionally apply.

c If the **radioactive contents** are uranium hexafluoride in quantities of 0.1 kg or more, the approval requirements for **packages** containing it shall additionally apply (see paras 802 and 807 of the Regulations).
If the radioactive contents are low dispersible radioactive material and the package is to be shipped by air, multilateral approval of the package design is required (see para. 808(b) of the Regulations).

If the radioactive contents are fissile material excepted under para. 417(f) of the Regulations, multilateral approval shall be required (see para. 805 of the Regulations).

Note 1: Before the first shipment of any package requiring competent authority approval of the design, the consignor shall ensure that a copy of the certificate of approval for that design has been submitted to the competent authority of each country (see para. 557 of the Regulations).

Note 2: Notification required if the radioactive contents exceed 3000 $A_1$, or 3000 $A_2$, or 1000 TBq, whichever is the lower (see para. 558 of the Regulations).

Note 3: Multilateral approval of shipment required if the radioactive contents exceed 3000 $A_1$, or 3000 $A_2$, or 1000 TBq, whichever is the lower, or if controlled intermittent venting is allowed (see para. 824825 of the Regulations).
<table>
<thead>
<tr>
<th>Key paragraph</th>
<th>Class of package or material</th>
<th>Competent authority approval required</th>
<th>Consignor required to notify country of origin and countries en route(^a) of each shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>Country of origin</td>
<td>Countries en route(^a)</td>
</tr>
<tr>
<td>814</td>
<td>Packages for Fissile material:</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Package design</td>
<td>Yes(^b)</td>
<td>Yes(^b)</td>
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<td>82482382(^5)</td>
<td>- Shipment:</td>
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<tr>
<td></td>
<td>(\Sigma) CSI (\leq) 50</td>
<td>No(^c)</td>
<td>No(^c)</td>
</tr>
<tr>
<td></td>
<td>(\Sigma) CSI (&gt;) 50</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>807</td>
<td>Packages containing 0.1 kg or more of uranium hexafluoride (^d):</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Package design</td>
<td>Yes</td>
<td>Yes for H(M)/No for H(U)</td>
</tr>
<tr>
<td>82482382(^5)</td>
<td>- Shipment</td>
<td>No(^c)</td>
<td>No(^c)</td>
</tr>
</tbody>
</table>

\(^a\) Countries through or into which (but not over which) the consignment is transported (see para. 204 of the Regulations).

\(^b\) Designs of packages containing fissile material may also require approval in respect of one of the other items in Annex I.

\(^c\) Shipments may, however, require approval in respect of one of the other items in Annex I.

\(^d\) If the radioactive contents are fissile material excepted under para. 417(f) of the Regulations, multilateral approval shall be required (see para. 805 of the Regulations).

Note 1: The multilateral approval requirement for fissile packages and some uranium hexafluoride packages automatically satisfies the requirement of para. 557 of the Regulations.

Note 2: Notification required if the radioactive contents exceed 3000 \(A_1\), or 3000 \(A_2\), or 1000 TBq, whichever is the lower (see para. 558 of the Regulations).
### ANNEX I: SUMMARY OF APPROVAL AND PRIOR NOTIFICATION REQUIREMENTS (Part 4)

<table>
<thead>
<tr>
<th>Key paragraphs in the Regulations</th>
<th>Class of package or material</th>
<th>Competent authority approval required</th>
<th>Consignor required to notify country of origin and countries en route of each shipment</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td>Country of origin</td>
<td>Countries en route&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Special form radioactive material:</td>
<td></td>
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</tr>
<tr>
<td>803</td>
<td>– Design</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>824823825</td>
<td>– Shipment</td>
<td>(see Note 1)</td>
<td>(see Note 1)</td>
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<tr>
<td>Low dispersible radioactive Material:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>803</td>
<td>– Design</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>824823825</td>
<td>– Shipment</td>
<td>(see Note 1)</td>
<td>(see Note 1)</td>
</tr>
<tr>
<td>Special arrangement:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>802, 828829, 558</td>
<td>– Shipment</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Type B (U) packages for which design is approved under:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>818820</td>
<td>-- 1973 Regulations</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>819</td>
<td>-- 1985 Regulations</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>805</td>
<td>Fissile material excepted from classification as FISSILE, in accordance with Table 1 para 606</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<sup>a</sup> Countries *through or into* which (but not over which) the *consignment* is transported (see para. 204 of the Regulations).

Note 1: See approval and prior notification requirements for applicable *package*.

Note 2: Before the first *shipment* of any *package* requiring *competent authority* approval of the *design*, the *consignor* shall ensure that a copy of the certificate of approval for that *design* has been submitted to the *competent authority* of each country (see para. 557 of the Regulations).
REFERENCES TO ANNEX I


Annex II
CONVERSION FACTORS AND PREFIXES

This edition of the Regulations for the Safe Transport of Radioactive Material uses the International System of Units (SI). The conversion factors for non-SI units are:

RADIATION UNITS

Activity in becquerel (Bq) or curie (Ci)

\[ 1 \text{ Ci} = 3.7 \times 10^{10} \text{ Bq} \]
\[ 1 \text{ Bq} = 2.7 \times 10^{-11} \text{ Ci} \]

Dose equivalent in sievert (Sv) or rem

\[ 1 \text{ rem} = 1.0 \times 10^{-2} \text{ Sv} \]
\[ 1 \text{ Sv} = 100 \text{ rem} \]

PRESSURE

Pressure in pascal (Pa) or (kgf/cm²)

\[ 1 \text{ kgf/cm}^2 = 9.806 \, 808 \times 10^4 \text{ Pa} \]
\[ 1 \text{ Pa} = 1.020 \times 10^{-5} \text{ kgf/cm}^2 \]

CONDUCTIVITY
Conductivity in siemens per metre (S/m) or (mho/cm)

10 µmho/cm = 1 mS/m
or
1 mho/cm = 100 S/m
1 S/m = 10^{-2} mho/cm
The decimal multiples and submultiples of a unit may be formed by prefixes or symbols, having the following meanings, placed before the name or symbol of the unit:

<table>
<thead>
<tr>
<th>Multiplying factor</th>
<th>Prefix</th>
<th>Symbol</th>
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</thead>
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<tr>
<td>$1 \times 10^{18}$</td>
<td>exa</td>
<td>E</td>
</tr>
<tr>
<td>$1 \times 10^{15}$</td>
<td>peta</td>
<td>P</td>
</tr>
<tr>
<td>$1 \times 10^{12}$</td>
<td>tera</td>
<td>T</td>
</tr>
<tr>
<td>$1 \times 10^{9}$</td>
<td>giga</td>
<td>G</td>
</tr>
<tr>
<td>$1 \times 10^{6}$</td>
<td>mega</td>
<td>M</td>
</tr>
<tr>
<td>$1 \times 10^{3}$</td>
<td>kilo</td>
<td>k</td>
</tr>
<tr>
<td>$10^{2}$</td>
<td>hecto</td>
<td>h</td>
</tr>
<tr>
<td>$10^{1}$</td>
<td>deca</td>
<td>da</td>
</tr>
<tr>
<td>$10^{-1}$</td>
<td>deci</td>
<td>d</td>
</tr>
<tr>
<td>$10^{-2}$</td>
<td>centi</td>
<td>c</td>
</tr>
<tr>
<td>$10^{-3}$</td>
<td>milli</td>
<td>m</td>
</tr>
<tr>
<td>$10^{-6}$</td>
<td>micro</td>
<td>µ</td>
</tr>
<tr>
<td>$10^{-9}$</td>
<td>nano</td>
<td>n</td>
</tr>
<tr>
<td>$10^{-12}$</td>
<td>pico</td>
<td>p</td>
</tr>
<tr>
<td>$10^{-15}$</td>
<td>femto</td>
<td>f</td>
</tr>
<tr>
<td>$10^{-18}$</td>
<td>atto</td>
<td>a</td>
</tr>
</tbody>
</table>

Annex III

SUMMARY OF CONSIGNMENTS REQUIRING EXCLUSIVE USE

The following consignments are required to be shipped under exclusive use:

(a) Unpackaged LSA-I material and SCO-I (see para. 520).
(b) Liquid LSA-I material in a Type IP-1 package (see para. 521 and Table 5).
(c) Gaseous and/or liquid LSA-II material in a Type IP-2 package (see para. 521 and Table 5).
(d) LSA-III material in a Type IP-2 package (see para. 521 and Table 5).
(e) Packages or overpacks having an individual TI greater than 10 or a consignment CSI greater than 50 (see paras 526 and 567).
(f) Packages or overpacks having the maximum radiation level at any point on the external surfaces that exceed 2 mSv/h (see para. 527).
(g) Loaded conveyance or large freight containers with a total sum of TI exceeding the values given in Table 10 (see subpara. 566 (a));
(h) Loaded conveyances or large freight containers with a total sum of CSI exceeding the values given in Table 11 for “not under exclusive use” (see para. 569).
(i) Type B(U), Type B(M) or Type C package whose temperature of accessible surfaces exceed 50°C when subject to an ambient temperature of 38°C in the absence of insolation (see para. 654).
(j) Up to 45 g of fissile nuclides on a conveyance, either packaged or unpackaged, in accordance with the provisions of paras 417(e) and 520 (d).
(k) Packages containing fissile material classified as non-fissile or fissile excepted under para. 417(a)(i) or (iii) of the 2009 Edition of these Regulations (see para. 820 821822).

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(by paragraph number)

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**CONTRIBUTORS TO DRAFTING AND REVIEW**

**BODIES FOR THE ENDORSEMENT OF SAFETY STANDARDS**
Excellencies, distinguished participants, ladies and gentlemen,

On behalf of the International Maritime Organization, I too would like to express my deepest sympathy and sincere condolences to the Government and the people of Japan for the heavy and devastating losses inflicted by the earthquake and the subsequent tsunami that struck Japan on 11 March 2011.

Once again the Government and the people of Japan have risen to the challenge and have faced these difficult circumstances with dignity, grace, transparency, exceptional and exemplary courage and determination. The International Maritime Organization has and will continue to provide all possible support to the Government and the people of Japan in the aftermath of the natural disaster and the threat posed by the nuclear plant crisis.

In line with its obligations set out in the Joint Radiation Emergency Management Plan of the International Organizations, IMO has and will continue to maintain close contact with the Government of Japan, the Agency, the World Health Organization, the World Meteorological Organization, the International Civil Aviation Organization, the World Tourism Organization, the International Labour Organization and others – thus ensuring a co-ordinated and harmonized international response to provide assurance to the public that the radiation levels in Japan do not at this moment in time present health or transportation hazards to passengers and crews.

The Joint Plan was activated during the Fukushima Daiichi incident and serves as an excellent example of cohesive multi-agency co-operation, fully aligned with the current UN initiative of “Delivering as one”.

In accordance with the Joint IMO/IHO/WMO Manual on Maritime Safety Information, relevant NAVAREA warnings, including a designation of dangerous area around the Fukushima Daiichi Plant, have been issued by the NAVAREA XI Co-ordinator, Japan. In addition, precautionary warnings have also been issued by other concerned NAVAREA Co-ordinators. In this regard, the co-operation and tireless efforts of all concerned are greatly appreciated.

IMO awaits the outcome of the Ministerial Conference, scheduled for next week, and is willing and ready to contribute to improving the international regimes on nuclear safety and radiation, and emergency preparedness and response on the basis of lessons learnt from the Fukushima accident.

Thank you.