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DEVELOPMENT OF THE IAEA SAFETY GUIDE 'FORMAT AND CONTENT OF THE PACKAGE DESIGN SAFETY REPORT (PDSR) FOR THE TRANSPORT OF RADIOACTIVE MATERIAL'

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ABSTRACT

Since 2005, several European countries, coordinated by the European Association of Competent Authorities (EACA), have been developing a guide on contents and structure of the documentation demonstrating the compliance with the regulations for packages for the transport of radioactive material (package design safety report, PDSR). This guide has been periodically improved, considering feedback from designers and authorities.

Taking into account the successful application of this guide in Europe, in 2013 the International Atomic Energy Agency (IAEA) decided to establish a similar guide as an IAEA document for promotion of worldwide use. The development of this IAEA guide started from the latest version of the European PDSR guide. In 2016/2017, during a 120-day review period, comments on the draft were received from member states and international organizations. These were incorporated into the draft in a series of meetings in 2017. In another meeting in December 2018 the draft was updated to be in line with the latest revision of the IAEA Regulations for the Safe Transport of Radioactive Material (SSR-6).

In this process the draft has been improved significantly, regarding structure as well as implementation of a graded approach depending on the package type, and clarified.

This paper points to the major considerations in developing the guide and important improvements over the last version of the European PDSR guide.

INTRODUCTION

For the transport of radioactive material, safety relies mainly on the safety functions of the package. The requirements on the package are set up in the IAEA Transport Regulations SSR-6 [1]. SSR-6 has been developed and continuously improved for more than fifty years. If applied correctly these regulations lead to a high safety standard. Therefore, compliance of packages with the requirements of SSR-6 is a major element in transport safety.

Some package designs (for Type B(U), Type B(M) and Type C packages, packages containing 0.1 kg or more of uranium hexafluoride and packages containing fissile material, unless excepted by paragraphs 417, 674 or 675 of SSR-6) require competent authority approval, others do not. For packages to be approved by the competent authority, a demonstration of compliance with all applicable provisions is required for supporting the application for approval. For non-approved packages, the consignor has to make available for the competent authority documentary evidence that the package design complies with all requirements of the applicable regulations. Therefore, since the assessment of whether a package design complies with all applicable requirements is a main safety feature, a guide on which paragraphs of SSR-6 apply to that design and which considerations and level of detail are expected in the assessment may improve the safety in transport of radioactive material significantly.

In this way, for strengthening safety and pushing forward international harmonization, the IAEA is developing the safety guide 'Format and Content of the Package Design Safety Report (PDSR) for the Transport of Radioactive Material' (IAEA PDSR Guide) [2]. This guide is intended to accompany the already existing main documents on the safe transport of radioactive material: the Transport Regulations SSR-6, the Advisory Material SSG-26 [3] and the Schedules SSG-33 [4].

INTENDED APPLICATION OF THE IAEA PDSR GUIDE

As described above, demonstration of compliance with all applicable requirements of the regulations for the transport of radioactive material is required for any package for the transport of radioactive material. For package designs requiring competent authority approval, this compliance demonstration has to be submitted to the competent authority; it is often called package design safety report (PDSR). For the purpose of the guide (and this paper), the compliance demonstration for packages not requiring competent authority approval is called a PDSR as well.

The Guide is intended to assist the designer of the package or the consignor in the preparation of the PDSR. At the same time, it will help competent authorities in assessing PDSRs and improving international harmonization of assessments of compliance of packages with the international or national transport regulations. It covers package designs requiring competent authority approval as well as package designs not requiring competent authority approval.

For achieving these aims the Guide includes the following information:

- General information about background, objective, scope, and structure of the Guide.
- Definitions and abbreviations used in the guide.
- Sections for each type of package, packages containing fissile nuclides and packages containing 0.1 kg or more of uranium hexafluoride. In these sections, a structure for the PDSR is proposed, and the information expected to be included in the PDSR for that package type is described for each item of the structure. The proposed structure of the PDSR is shown in Fig. 1.
- A matrix listing the applicable paragraphs of SSR-6 for each type of package and the provisions of SSR-6 additionally applicable to packages containing fissile nuclides and uranium hexafluoride.
- A list of reference documents, such as standards and specific guides used by competent authorities of a number of member states.

The Guide is based on SSR-6 which are generally consistent with international regulations for the road, rail, sea, inland waterways and air modes of transport (ADR, RID, IMDG code, ADN and ICAO TI). Therefore, the Guide can be applied for demonstrating compliance with SSR-6, the mentioned international modal regulations and national regulations conforming to one of these international regulations.

The Guide is not intended to replace the regulations or limit their application but to help identifying and meeting the requirements by proposing a structure and a minimum contents for a PDSR.

DRAFTING OF THE GUIDE

The draft of the IAEA PDSR Guide is based on the Technical Guide 'Package Design Safety Reports for the Transport of Radioactive Material' [5]. The development of this Technical Guide has been initiated and supported by the European Commission to improve harmonization in this field in Europe. The work started in 2005, based on various national guidelines available in some European countries. The first edition of the Technical Guide was produced in 2008 with inputs from several European authorities, technical support organisations and industry. Since then it has been maintained by EACA, incorporating feedback from the application of the guide. The Technical Guide is available on the EACA website (see ref. [5]). Its development was presented at PATRAM 2007 [6].

Taking into account the successful application of this guide in Europe, in 2013, the IAEA decided to establish a similar guide as an IAEA document for promotion of worldwide use. The development of this IAEA guide started from the latest version of the European PDSR guide. In 2016/2017 during a 120-day review period, 390 comments on the draft were received from member states and international organizations. These have been incorporated into the draft in a series of meetings in 2017. In another meeting in December 2018, the draft has been updated to be in line with the latest edition of SSR-6 [1]. Comments from the member states and international organizations proposed editorial changes, but also addressed other areas:

- Strengthening a graded approach for the information required for the different types of packages. The annexes proposing the amount of information to be given for each of the types of package originally

had been developed mostly independently from each other. It was decided that useful contents should be shared between the package types, and that at the same time details not necessary for a certain package type should be removed. This process strengthens a graded approach, proposing only a limited set of information to be given for an excepted package, and increasingly more detail for an industrial package and Type A, Type B(U), Type B(M) and Type C packages.

- Clarifying the proposed structure of technical analyses in Part 2 of the PDSR. There was feedback about potential misinterpretation of the proposed 'general considerations for all technical analyses' in Part 2 of the PDSR. This chapter proposed that structural, thermal, containment, shielding and criticality analyses provided in the PDSR should follow some structure linking them to certain specifications of packaging and contents, acceptance criteria and design assumptions. To clarify this intention, the corresponding chapter on package performance characteristics in the guide was reworded.
- Consistently following changes in SSR-6 regarding fissile material. The new ways for shipping fissile material established in the 2012 Edition had not been completely implemented into the European PDSR guide. This concerns especially the information required to show compliance with paragraphs 417 or 674/675 of SSR-6 if these provisions are used. The section dealing with fissile material has been restructured and the necessary information has been added to fully correspond to SSR-6.

KEEPING THE GUIDE IN LINE WITH THE REVISION OF SSR-6

The Guide needs to be in line with the development of SSR-6 and SSG-26. Therefore, as a last step of drafting the Guide, it was updated to reflect the current 2018 Edition of SSR-6 and the latest draft of the new revision of SSG-26 from summer 2018. This mostly concerned the ageing considerations explicitly introduced in the 2018 Edition of SSR-6. It is proposed to include the information required for demonstration of compliance with paragraph 613A of the 2018 Edition of SSR-6 in a new chapter 'Ageing Consideration'. Depending on the potential influence of ageing on the specific package design, this chapter should include conditions of use which may influence ageing, potential ageing mechanisms, operational measures to monitor and limit the ageing effect and an analysis of the influence of the ageing of packaging and radioactive contents on the design assumptions for demonstration of compliance with the regulations. Additionally, the guide now proposes a new chapter for the PDSR dealing with the gap analysis programme for packages which are intended to be used for shipment after storage.

At the 34th Meeting of the Transport Safety Standards Committee (TRANSSC 34, 2017), the IAEA secretariat stated that in future the IAEA PDSR Guides shall be developed in the same review and revision process as SSR-6.

CONCLUSIONS

The IAEA is developing a guide proposing a structure and contents of a report demonstrating compliance of a package design with the applicable regulations (package design safety report – PDSR). This PDSR guide is based on an existing and successfully applied similar guide maintained by EACA but has been updated to reflect the current edition of SSR-6 and improved during drafting. It is applicable to package designs requiring competent authority approval as well as package designs that do not need approval by the competent authority. The guide contains useful information for demonstrating compliance with SSR-6 as well as the international modal regulations.

Designers of packages and competent authorities are encouraged to use this guide, after completion, for creating or assessing package design safety reports. Feedback on the use should be provided to the IAEA.

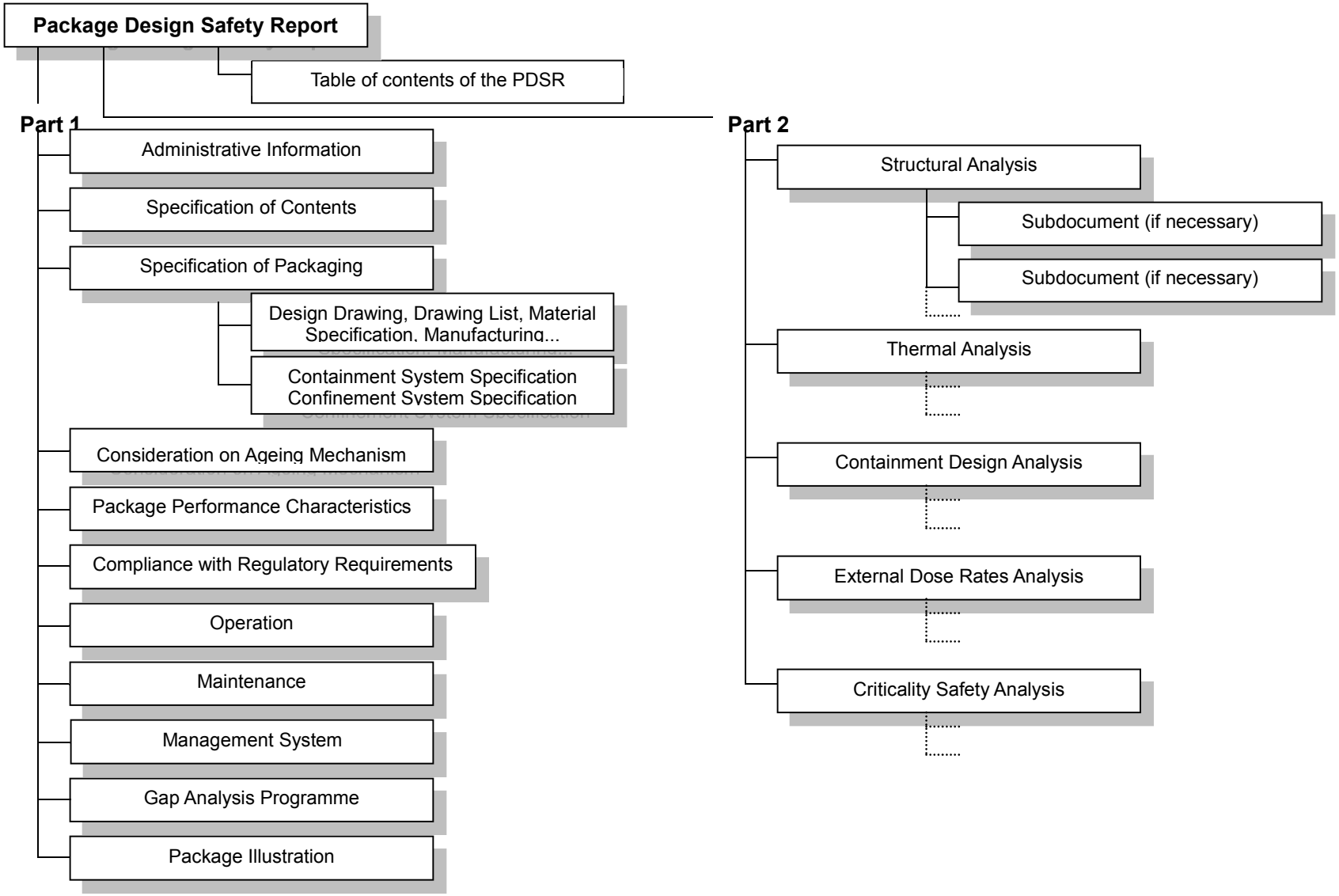

Figure 1. The structure of the PDSR as proposed by the guide

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