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**THE GERMAN GRADED APPROACH FOR DIFFERENT VALIDITY PERIODS OF
PACKAGE DESIGN APPROVALS**

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ABSTRACT

The international and national requirements for the approval of package designs for the transport of radioactive material which are all based on the IAEA Regulations for the Safe Transport of Radioactive Material (SSR-6) do not restrict the validity periods of approvals issued by a competent authority. In Germany, package design approvals are generally issued for 3 years. However, it is possible to authorize other validity periods if applied for and justified by the applicant.

For example, for a package design approval application for a validity period of 10 years or longer certain conditions have to be fulfilled (e.g., manufacturing is excluded, all casks are loaded and stored in an interim storage facility) and the applicant has to provide to the competent authorities initially and periodically evaluation reports for ageing, for verification procedures used in the Package Design Safety Report (PDSR) for demonstrating safety and for operational experiences. By reviewing these evaluation reports as well as the evaluation of the impact of regulatory changes on the package design approval periodically it will be ensured that all requirements for a package design approval are met also in future or, if necessary, appropriate measures can be taken, respectively.

Thereby the progress of the 2018 Edition of the IAEA Regulations for the Safe Transport of Radioactive Material (SSR-6, Rev. 1) regarding dual purpose casks for transport and storage of spent fuel and high active waste is already taken into account.

This paper presents details of the German graded approach: which conditions shall be met and which documents and proofs shall be provided for assessment to the competent authorities of Germany (BfE and BAM) to achieve longer validity periods.

1. INTRODUCTION

The international and national requirements for the approval of package designs for the transport of radioactive material which are all based on the IAEA Regulations for the Safe Transport of Radioactive Material (SSR-6) [1] do not restrict the validity periods of approvals issued by a competent authority.

In Germany, package design approvals are generally issued for 3 years according to the German Guideline R 003 [2]. Moreover, with this Guideline it is possible to authorize also other validity periods if applied for and justified by the applicant. The conditions and requirements for other validity periods are summarized in a document of Federal Office for the Safety of Nuclear Waste Management (BfE) and Federal Institute for Materials Research and Testing (BAM) [3], available on the BfE homepage. This document is the result of an approx. 15 years discussion and experience process between applicants and authorities [4, 5, 6]. The process has been initiated at that time where packages are not transported frequently, such as Dual Purpose Casks (DPC) for transport and storage to minimize regularly prolongation of the package design approval due to short validity periods.

To achieve enough experiences with longer validity periods intermediate steps (validity periods of 5 years and 10 years) were realized. All conditions and requirements were and will be subject to a periodic re-evaluation.

This paper gives details of the currently used German graded approach. It will be described which conditions have to be met and which documents and proofs have to be provided for assessment to the competent authorities of Germany (BfE and BAM) to achieve longer validity periods.

2. THE GRADED APPROACH, CONDITIONS AND REQUIREMENTS

The graded approach includes to the following validity periods:

- validity period of a maximum of 3 years
- validity period of a maximum of 5 years
- validity period of a maximum of 10 years
- validity period of a more than 10 years

2.1 Validity period of a maximum of 3 years

The usual validity period is 3 years. Approvals are granted for a maximum of 3 years

- for package designs based on the IAEA Regulations from 1985 (1985 Edition, Supplement 1986, Supplement 1988, As Amended 1990)

as well as

- for package designs that meet the IAEA Regulations of 1996 or later (ST-1, ST-1 Revised, TS-R-1 As Amended 2003, TS-R-1 2005 Edition, TS-R-1 2009 Edition, SSR-6 2012 Edition) and for which no differing validity period as specified in the German Guideline R 003 has been applied for.

In principle, no further conditions and requirements concerning the validity period have to be met. Of course, this applies only if all applicable requirements of the IAEA Regulations that

the package design is based on together with transitional arrangements, if necessary, are fulfilled.

2.2 Validity period of a maximum of 5 years

Approvals for package designs that meet the IAEA Regulations of 1996 and later are granted for a maximum of 5 years if applied for, but in principle without having to meet any further conditions. The German competent authorities are convinced that requirements, design rules and other standards on the one hand and the quality of the safety demonstrations and the documents for use, periodical inspections and maintenance, summarized in the Package Design Safety Report (PDSR), on the other hand are of a good quality level.

Furthermore, an approval for a package design of dual purpose casks for transport and storage issued according to the IAEA Regulations of 1985 may be subject to a 5-year validity period, provided that

- the PDSR is free of inconsistencies and BfE/BAM notes on previous PDSR documents have been properly addressed.
- Packagings may still be loaded.

2.3 Validity period of a maximum of 10 years

Currently, an application with a validity period of a maximum of 10 years is intended only for package designs of dual purpose casks for transport and storage issued according to the IAEA Regulations of 1985 or 1996 or later.

Therefore, the following conditions have to be met at the time of application:

- no new packagings will be manufactured,
- loading of packagings is no longer intended and
- all packages are stored in an interim storage facility and will not be transported in the foreseeable future.

In addition, the validity period is associated with the following conditions:

- The PDSR is free of inconsistencies and BfE/BAM notes on previous PDSR documents have been properly addressed.
- Regularly after the introduction of new IAEA regulations to national law, an assessment of the regulatory changes with regard to their relevance to the PDSR must be carried out and sent to BfE and BAM for information.

This requirement will be specified in the package design approval.

- At the time of the application and then regularly every 5 years (5-year-appraisal) the approval holder has to review all regulations, standards etc. relevant for the package design with regard to safety-related criteria/proofs essential for the package design approval. The competent authorities (BfE and BAM) have to be informed about the results by sending appraisal report(s).

This requirement will be specified in the package design approval. The appraisal reports will be assessed by BfE and BAM. The assessment with positive results is a prerequisite for the maintenance of the approval.

In detail, the appraisal reports should reflect the following main aspects:

- verification of the validity of the requirements and verification procedures on which the PDSR is based
- evaluation of the experiences during the operation of packages (use, handling, transport, storage) including the evaluation of unexpected events and incidents
- listing and explanation of deviations that occurred during operation
- note on being up-to-date and the validity of the documents for the design, use and maintenance, including the listing of
 - revised design type lists, certificates of modification (changes regarding parts lists with specified drawings and material specifications, which have received approval by BfE after clearance by BAM in accordance with a special provision of the package design approval [7]) with a note about the validity status and, if necessary, an explanation about their application
 - revised documents for the use and maintenance (the application of revised documents is only accepted after clearance by BAM and approval by BfE in accordance with a special provision in the package design approval)
- listing of all documents (e.g. regarding transport covers, transport frames), that require a clearance/approval by the competent authorities (BfE/BAM) in accordance with specifications in other documents (e.g. operating instructions)
- documentation and evaluation of errors identified in the package design safety report (e.g. typing errors, mix-ups)
- evaluation of ageing effects on the safety-relevant input parameters of the design and on the requirements of periodic inspection before transport from a storage facility

2.4 Validity period of more than 10 years

Validity periods of more than 10 years may be applied for approvals for package designs of dual purpose casks for transport and storage solely and where the original approvals were issued according to the IAEA Regulations of 1985 or 1996 and later, respectively.

The following requirements and conditions apply:

- The requirements and conditions for transport and storage casks as described in chapter 2.3 have to be met.
- The validity period must be specified and justified in the application.

However, it is limited to the period of validity of the currently approved interim storage facilities in Germany with stored packages of this design.

- The evaluation of ageing effects must cover the above-mentioned period from the first loading to the latest end of the storage period approved for the packages of the design applied for.

With regard to the preparation of the appraisal reports, it should be noted that compared to evaluations for shorter validity periods (e.g., 5 years or 10 years)

- more attention has to be paid to changes in design standards, guidelines or rules. In particular, changes should be assessed first at the standard level before this is transferred to the verification level,
- knowledge of the original verification philosophy and its relation to the advanced state of the art must be taken into account in more detail in order to ensure knowledge transfer via the evaluation cycles,
- the assessment of the continued applicability of the documents for operation and maintenance is supplemented as part of the assessment of operating experience.

3. CONCLUSION

German authorities and approval holders made good experiences with the graded approach concerning validity periods of package design approvals. 2007 the first two approvals with a validity of 10 years were issued for package designs with high active waste (HAW) from reprocessing. In the meantime the validity of these approvals were prolonged for further 10 years after assessing the appraisal reports with positive results by the competent authorities BfE and BAM. One more approval with a 10 years validity period was issued in 2017, now for a package design with irradiated fuel elements. In the appropriated appraisal reports some aspects concerning ageing effects have to be addressed and evaluated that are different from package designs for HAW. The first approval with a validity period longer than 10 years was issued again for a package design loaded with HAW in 2017 with a validity of 17 years. Currently BfE and BAM are working on 6 applications, most of them loaded with irradiated fuel elements, with longer validity periods than 10 years.

4. LITERATURE

- [1] IAEA Safety Standards, Regulations for the Safe Transport of Radioactive Material, 2012 Edition, Specific Safety Requirements No. SSR-6, International Energy Agency, Vienna, 2012
- [2] Richtlinie für das Verfahren der Bauart-Zulassung von Versandstücken zur Beförderung radioaktiver Stoffe, von radioaktiven Stoffen in besonderer Form, von gering dispergierbaren radioaktiven Stoffen und freigestellten spaltbaren Stoffen (R003) in der Fassung der Bekanntmachung vom 09. Juni 2016 (VkB1. 2016 S. 430)
(*English translation of the guideline available at:*
https://www.bfe.bund.de/EN/nwm/approval_of_packages/expert_information/guideline_R003.html)
- [3] Bundesamt für kerntechnische Entsorgungssicherheit
Bauart-Zulassungen von Versandstücken zur Beförderung radioaktiver Stoffe –
Gültigkeitsdauern, Voraussetzungen und Bedingungen

Package design approvals for the transport of radioactive material – Validity periods,
Requirements and Conditions

GE 3 – 83100/Gültigkeitsdauer (Stand 30.08.2018)

Salzgitter, August 2018

(English translation of the document available at:

https://www.bfe.bund.de/EN/nwm/approval_of_packages/expert_information/validity_approvals.html)

- [4] Nitsche, F.; Börst, F.-M.; Reiche, I.
The German Regulatory Concept Of Transport Package Design Approval For Dual Purpose Casks During Interim Storage
Proceedings of the 17th International Symposium on the Packaging and Transportation of Radioactive Materials (PATRAM 2013), San Francisco, USA (2013)
- [5] Wille, F.; Droste, B.; Völzke, H.
German Approach And Experience Feedback Of Transport Ability Of SNF Packages After Interim Storage
Proceedings of the 17th International Symposium on the Packaging and Transportation of Radioactive Materials (PATRAM 2013), San Francisco, USA (2013)
- [6] Droste, B; Wille, F.
Maintenance Of Package Design Safety Report Effectiveness Of SNF And HLW Dual Purpose Casks
Proceedings of the 17th International Symposium on the Packaging and Transportation of Radioactive Materials (PATRAM 2013), San Francisco, USA (2013)
- [7] Börst, F.-M.; Nitsche F.
Package Design Approval Certificate Specification – How Specific Is Specific Enough?
Proceedings of the International Symposium on Packaging and Transportation of Radioactive Materials (PATRAM 2001), Chicago (2001)