TECDOC-DPCSC
“Methodology for a Safety Case of a Dual Purpose Cask for Storage and Transport of Spent Fuel”

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Agenda Item 3.1.3

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TECDOC-DPCSC drafted by: Joint WG on Guidance for an Integrated Transport and Storage Safety Case for Dual Purpose Casks (2011-2013)
Background / Objective of the JWG

**Background**

- Growing amount of SNF in storage caused by delays in decision on SF disposition
  - Necessity of additional storage capacity
    1. Wet storage
    2. Dry storage
    - Includes DPCs designed for both transport / storage
- Intention is to provide guidance to MSs for integrating safety cases for storage and transport in a holistic manner
  - Establishment of a joint international working group

**Objective**

1. To provide an IAEA document containing recommendations and guidance for the structure and contents of an Integrated Safety Case for a dual purpose storage and transport cask.
2. Recommendation for changes to be made to existing IAEA documents
Dual Purpose Cask

**DPC transport package**
- Designed for off-site transport before / after storage
- Compliance with international / national regulations for transport
- With impact limiters

**DPC storage package**
- Designed for storage of spent fuel
- Compliance with international standards / national regulations for storage (+ on-site transport)
- Often has a closure system with additional lids, with lid interspace pressure monitoring
Scope of the document

- Dual Purpose Casks – Transport / Storage
  - Guideline for establishing integrated safety cases in consideration of the interface issues between storage and transport casks.
- Storage period – 50 years (short term) / 100 years (long term)
  - Specific description with examples for explaining the application of the methodology, including aging assessments
- Mainly for metallic casks

Working Group

Chair: B. Droste (BAM, Germany)
SWG leads: M. Hirose (NFT, Japan)
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Secretary: P. McConnell (SNL, USA)
IAEA: Y. Kumano, K. Varley
What is a Safety Case? (IAEA GSR Part 5)

- collection of arguments and evidence in support of the safety of a facility or activity.
- normally include the findings of a safety assessment
- typically include information (including supporting evidence and reasoning) on the robustness and reliability of the safety assessment and the assumptions made therein

→ Then … what is a Safety Case for a DPC?
Proposed Structure of a DPC safety case

Part 1

Contents List

- Administrative Information
- Specification of Contents
- Specification of Dual Purpose Cask
- Storage and Transport Conditions
- General Design Considerations and Acceptance Criteria
- Ageing Considerations
- Compliance with Regulatory Requirements
- Operation
- Maintenance Plan
- Emergency Plan
- Management Systems
- Decommissioning

Part 2

Common Provisions for all Technical Analysis

- Structural Analysis
- Subdocument (if necessary)
- Thermal Analysis
- Subdocument (if necessary)
- Activity Release Analysis
- External Dose Rates Analysis
- Criticality Safety Analysis
Safety Case for DPCs

Main features to be considered

- How to define acceptance criteria

- Ageing consideration for long-term storage and transport after storage
  - Design / Fabrication
  - Operation
  - Retrievability
    → Ageing management programme

- Licensing consideration
  - Licensing for both storage / transport
  - Licensing renewal (esp. for transport)
  - Change of transport regulations / new technology development

- And…
  - Inspections before transport
  - Records during fabrication/operation
Safety Case for DPCs – acceptance criteria

- Acceptance criteria
  - regulatory limits + requirements from facility design
- Design specifications
  - clarified through engineering process for the DPC design
Safety Case for DPCs – ageing considerations

- Ageing of DPC components is mostly identical to normal storage casks, but has to be assessed taking into account the different acceptance criteria for DPC transport package design.

- However, it is important to keep in mind that:
  - DPC can be stored in a facility that doesn’t have instruments/facilities to open lids and change internal closure system components.
  - DPC has to be designed to ensure safety of transport even after long-term storage without opening lids.
    - Additional lid for transport
    - Repair concept by welding another lid etc.
Safety Case for DPCs – licensing considerations

➢ Transport package design approval is normally issued for a few to several years.
  → The license needs to be revalidated for the next period by a demonstration of compliance with the current transport regulations.

➢ Storage license can be issued for a planned storage period
  → Periodical reassessments of the condition of the DPC system is inevitable

Therefore…

Development of ageing management programme in the safety case &

Gap analysis becomes important to ensure the safety of storage and safe transport after storage

❑ New technology developments
❑ New findings
❑ Any change of regulations (esp. for transport)
Safety Case for DPCs
– inspection before transport

**Inspection before transport**
for ensuring safety of transportation

1) External appearance
2) Leak tightness
3) Pressure retention
4) Dose rate
5) Subcriticality
6) External surface temperature
7) Lifting capability
8) Weight measurement
9) Condition of contents
10) Surface contamination ....

**difficult to perform after storage**

Consideration on alternate means of inspection in combination with the ageing evaluation is important
JWG Results

- Draft IAEA technical document
- Recommendations to TRANSSC
- Publication process
DPCSC structure is based on European Competent Authorities Guide on PDSR for packages for the transport of radioactive material.

INTRODUCTION

PART 1: GENERAL PRINCIPLES AND TECHNICAL INFORMATION

PART 2: SPECIFIC TECHNICAL ASSESSMENT

REFERENCES

DEFINITIONS

ANNEX: EXAMPLE FOR THE HOLISTIC APPROACH OF A DPCSC FOR AN OPERATIONAL SCENARIO
Operational Scenario:
The DPC operational scenario consists of various steps addressed in the DPCSC.

a. DPC package preparation (for transport and storage, including spent fuel loading and inspections);
b. On site transport (before storage and/or after storage);
c. Off site transport (before storage and/or after storage);
d. Handling at storage facility (before and after storage);
e. Storage (on site or off site);
f. DPC package unloading (at the destination of transport after storage).
JWG Results

Operational steps
JWG Results

Example:
Scenario for on-site and off-site storage operational steps
JWG Results – Recommendations to TRANSSC

JWG recommended to TRANSSC to revise SSR-6 and SSG-26 in order to incorporate DPC concept.

1. It is recommended to consider introducing a definition of DPC packages in SSR-6.

2. There should be a requirement or guidance to consider ageing of packages that are intended to be stored for a long time before the transport.

3. Any change of SSR-6 shall consider “Transitional Arrangement” in an appropriate manner so that they can be transported after storage.

4. It is recommended to develop an appropriate guidance material on this matter in SSG-26.

5. SSR-6 should be reviewed with respect to the timespan between loading of the package and the completion of the shipment after storage to be consistent with the operation of DPC.

⇒ SSR-6 & SSG-26 20xx Edition
Publication Process

- April 2013: Completion of drafting by the JWG.
- Aug. 2014: 231 comments from the IAEA internal review, mainly from the NE Dept.
  ⇒ Responded by the Secretariat and JWG.
- April 2015: Draft for DDG clearance with TC
- Sept. 2015: Further comments from the Publication Section including changes of title and structure.
  ⇒ Responded by the Secretariat and JWG
- Nov. 2016: Publication ready draft was proposed.
- Current draft is available at:
  
Our Problems:

Delay of publication of TECDOC-DPCSC causes:

- Motivation for IAEA DPC project is fading,
- Some contents of the TECDOC-DPCSC become outdated,
- DS496 (Revision of SSG-26) refers TECDOC-DPCSC. If not published, it cannot be referred.
- TRANSSC cannot approve reference document that they have not seen.

**TRANSSC Action:** 1. Read TECDOC-DPCSC  
2. ?????
Thank you!