Transportability of Dual Purpose Casks in Germany

- Situation and Perspective -

Frank Wille

BAM Federal Institute for Materials Research and Testing
Berlin, Germany

IAEA International Workshop on Dual Purpose Casks
May 19-21, 2014, Vienna
Outline

(1) Introduction

(2) Legal Framework

(3) Gap Analysis / Lessons Learned / Consequences

(4) Experience on Transport Preparation after Storage
Introduction

Concept of Dry Interim Storage for SNF and HLW in Germany

- according to German Reactor Safety Commission (ESK) guidelines 2013

- accident safe dual purpose metal casks with
  - package approval certificate
  - two independent sealed barriere lids
  - permanent monitoring of cask tightness

- storage period of up to 40 years
Design Approval Procedure (Transport)

Approval Certificate

- for transport on public routes
- at time of storage placement
- over storage time

Presentation by Dr Reiche
The German Regulatory Concept of Transport Package Design Approval for DPC during Interim Storage

Type B(U) Certificate

Package Design Approval Procedure

according IAEA Regulations and Domestic Guidelines
Package Design Approval Certificate

Certificate is valid

Regular Package Design

up to 5 years

"Cask Loaded and Stored"

- exclusion of further manufacturing
- cask loaded and placed in storage
- intervals of maintenance and updating the PDSR determined

Transport Package design well known over storage period

- constantly care of the safety cases incl. documents concerning compliance to the regulations
- transport is possible at any time
Tests and Inspections for Transport after Storage

Regular Transport Packaging: after unloading, all sections accessible

⇒ System of Periodic Inspections

Transport after Storage:

⇒ System of Specific Tests and Inspections

accessible package sections

- visual inspections,
- load testing,
- replacement of components

⇒ check of the containment system

- check of the pressure monitoring system,
- lid screws (tightening torque),
- leak-tightness

⇒ measurements

- verification of shielding effectiveness

© GNS
Gap Analysis / Lessons Learned / Consequences
periodic safety inspection and aging management procedure is going to be implemented (related to storage & transport)

extension of transport regulatory requirements for Dual Purpose Casks

Consideration of aged materials & components

long term behavior of material, components & inventory under transport conditions

- Long term behavior
  - Storage Cask

- Behavior of aged components
  - Transport Cask

40 years One time transport
What is necessary for SNF transports in future?

Requirement: **Provide solvable situation for future generations!**

transport under special arrangement vs. re-packing vs. constructional strengthening (e.g. overpack) vs. **valid transport approval certificate**

**Present Concept in Germany**

Aging management of knowledge about transport cask incl. safety methods and analysis

Maintenance of the PDSR of the transport cask
Consequences from PDSR Review Process

Package description and manufacturing (if applicable)

- feedback and experience out of manufacturing of the packaging
- improvements of specifications, drawings, and parts list
- Reflection of document status and practical experience
- Allowance of manufacturing of components in far future, e.g. impact limiter

Package operation

- Operation of the package generates feedback
- operation and maintenance manual of the package need to be revised periodically

Examples:

Standards are changing periodically. Test procedure during re-inspections might be revised.

How transports are performed is changing over the time. Operating procedure for stowage of the cask on the transport vehicle might be revised.

Equipment is changed. What kind of canopy is used for a future transport?
Consequences from PDSR Review Process

Safety Analysis of Package Design

- Over recent decades requirements of transport regulations were stable
- Safety demonstration methods (analysis methods) are changing over decades
- Periodically revision of standards & guidelines
- New results of experimental investigations, e.g. friction coefficients

**safety cases might to be revised**

Simplified Approach  
Numerical Approach
Consequences from PDSR Review Process

What can be done, if new methods show safety margins are not sufficient?

- safety of the package has to be enhanced
- improvement of components, e.g. impact limiter design

Example: Improvement of Package Impact Limiter Design design
Experience in Transport Preparation after Storage

© FZJ
CASTOR® THTR/AVR

Interim Storage of SNF of decommissioned gas cooled high temperature research reactor in Jülich, Germany

- 20 years storage license ended in 2013
- But: 10 year transport approval certificate is valid

✓ 152 casks loaded between 1993 - 2009

✓ monolithic ductile cast iron cask body

✓ double lid closure system  
  (permanent pressure monitored)

✓ metallic seals

✓ upper & lower pair of trunnions

✓ bottom & top impact limiters  
  (transport configuration)
Test and Inspection Plan

Transport preparation of 152 casks is ongoing

- Check of documentation of pressure monitoring system
- Visual check of surfaces
- Examination of bolting torque of primary lid bolts
- Leak-tightness tests of lid systems

© FZJ
CASTOR© THTR/AVR fulfills current regulatory requirements ✔

45 packages were inspected and tested ✔

Transport ability was retained after 20 years of storage!