A SMALL CASK FOR SPENT FUEL SAMPLE TRANSPORTATION – SOME CONSIDERATIONS ABOUT TRANSPORT REGULATIONS INCLUDING FISSION EXCEPTIONS AND LICENSING

Ingo Reiche
Federal Office for Radiation Protection, Salzgitter, Germany

CSM Vienna, May 2010
Transport of fissile material – revision of the exceptions

Transport regulations – package types

Transport of fissile material – revision of the exceptions

As a result of the current revision process of the IAEA transport regulations a change of the criteria for fissile excepted material is expected:

• Exception for 15g of fissile nuclides per package subject to consignment limit will be replaced by smaller limit (0.5g for fissile U and Pu isotopes)

• New exception will be introduced for 45g of fissile nuclides per package if transported under exclusive use, max. 45g of fissile nuclides per conveyance

• Fissile material may be transported without multilateral package design approval under new para. 672: max. 35g (23g if mixed with PE,…) of fissile nuclides, with CSI=10 and FISSILE UN number
Transport regulations – package types

For transporting spent fuel \((10^{15} \text{ Bq})\) a type B(U) or type C package is required.

For air transport Type B(U) is restricted to

- low dispersible radioactive material as authorised for the package design
- special form radioactive material up to 3000 \(A_1\) or \(10^5 A_2\) (which is lower)
- other radioactive material up to 3000 \(A_2\)

Investigations in Type C casks have been reported from Russia and France.

Development of the guide

- Initiated and supported by the European Commission to improve harmonization in this field in Europe
- First meeting in May 2005, Issue 1 published in June 2008
- Development of the guide by a special working group with experts from Belgium, France, Germany, Spain, UK, WNTI and AREVA

Scope of the guide

- For all types of packages (competent authority approved or not)
- Based on TS-R-1 (suitable also for ADR, RID, IMDG code, ADNR, ICAO)
- Does not replace the regulations but provides a structure and a minimum contents of the PDSR to assist the applicant or designer in demonstrating compliance with the regulatory requirements
Structure of the guide

0 Introduction and generalities
   Objective and scope
   Definitions
   Structure of the document
   Unit system
   Document control

1 Package design safety report: Part 1

2 Package design safety report: Part 2

3 References

Figure: Structure of Package Design Safety Report
Table: Matrix of IAEA, ADR Regulatory Requirements and Package Type

Annexes
   Annex 1: Excepted package
   Annex 2: Industrial package (Type IP-1, Type IP-2, Type IP-3)
   Annex 3: Type A package
   Annex 4: Type B(U), Type B(M), Type C package
   Annex 5: Package containing fissile material
   Annex 6: Package containing more than 0.1 kg uranium hexafluoride

Generic information applicable to all package types
package type dependent information
Structure and contents of the PDSR

Part 1
- Administrative Information
- Specification of Radioactive Contents
- Specification of Packaging
- Design Drawing, Drawing List, Material Specification, Manufacturing ...
- Containment Specification
- Confinement Specification
- Package Performance Characteristics
- Compliance with Regulatory Requirements
- Operation
- Maintenance
- Management System
- Package Illustration

Part 2
- Structural Analysis
  - Subdocument (if necessary)
  - Subdocument (if necessary)
- Thermal Analysis
- Containment Design Analysis
- External Dose Rates Analysis
- Criticality Safety Analysis
## Matrix of IAEA and ADR regulatory requirements and package type

<table>
<thead>
<tr>
<th>Section</th>
<th>§ TS-R-1 (2005)</th>
<th>§ 2007ADR</th>
<th>package type</th>
<th>additional provisions</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>excepted</td>
<td>TYPE IP-1</td>
<td>TYPE IP-2</td>
</tr>
<tr>
<td>DEFINITIONS</td>
<td>222</td>
<td>2.2.7.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>225</td>
<td>2.2.7.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>226</td>
<td>2.2.7.3.1 + 2 (x2.2.7.2)</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>239</td>
<td>2.2.7.4.1 (x2.2.7.2)</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>241</td>
<td>2.2.7.5 (x2.2.7.2)</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>QA</td>
<td>306</td>
<td>1.7.3</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>ACTIVITY LIMITS AND MATERIAL RESTRICTIONS</td>
<td>408-410</td>
<td>2.2.7.7.1.2.1 + 2 X</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>412-413</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>414-415</td>
<td>2.2.7.7.1.4.1 + 2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>416</td>
<td>2.2.7.7.1.5.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>417</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>418</td>
<td>2.2.7.7.1.6 + Note</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>419</td>
<td>2.2.7.7.1.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>420</td>
<td>2.2.7.7.1.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REQUIREMENTS AND CONTROLS FOR TRANSPORT</td>
<td>503</td>
<td>4.1.9.1.3</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>507</td>
<td>1.7.5, 2.1.3.5.3, M</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>508</td>
<td>4.1.9.1.2</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>515-520</td>
<td>2.2.7.9.1 to 7</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Available at

http://www.dft.gov.uk/adobepdf/165226/460089/radioactive
tmaterial.pdf