New cask for transportation of irradiated rods

Hotlab meeting, Petten, May 25th 2005, David Ohayon
For irradiated materials, COGEMA LOGISTICS operates a fleet of diversified packaging and offers customized solutions and services.

Which cask for the transport of irradiated rods?
TN™MIL cask
Summary of the presentation

✓ A challenge preparing the future
✓ Design of the TN-MIL : Main guidelines
✓ Main contents to be transported and option
✓ Use of TN-MIL cask
✓ A design based on the TN 106 knowledge
✓ TN-MIL : Main characteristics
✓ TN-MIL : Basic design
✓ TN-MIL : Project schedule
✓ TN 106 operations
✓ Conclusion
Why start a new development?

- To answer to an existing market
- To continue to provide our customer with the best solution
- To find a successor to the old existing packages
- To be ready in time

What’s sort of challenge?

- The TN-MIL should be in operation in 2 years in France
  - One year for the establishment of the SAR without drop test
  - One year for the review of the SAR by the Authorities
- It should be in operation in Europe (and option in US) 6 months later
TN™ MIL cask

Design of the TN-MIL : Main guidelines

✓ Cask dedicated for the transport of irradiated rods PWR, leaktight or not, encapsulated or not.

✓ As an option, cask will be able to transport one BWR assembly or to transport, in the future, EPR irradiated rods.

✓ Basic design accommodating with

  ✓ all EDF NPP.

  ✓ hot cells worldwide : Cadarache (CEA-France), Studsvik (Sweden), MOL (Belgium), TUI (Germany), Oak Ridge (US), RJH (France)…

  ✓ various applicable regulations

  ✓ low maintenance costs and low exploitation costs.

✓ TN 106 package design.
TN™MIL cask
Main contents
(include in basic SAR)

✓ Irradiated rods PWR 900 and 1300 MW, leaktight or not, encapsulated or not
  ✓ 10 UOx rods, Enrichment ≤ 10%
    90 000 MWj/tU
    6 months cooling time
  ✓ 10 MOX rods, Pu ≤ 11%
    90 000 MWj/(U+Pu)
    6 months cooling time.
✓ Mix of MOX + UOx without any loading plan
✓ Maximum decay heat : 2 kW
TN™ MIL cask
Additional contents
(Option of the SAR)

✔ BWR Assembly (10 x 10)
  ✔ Section: 141 x 141 mm² - length: 4500 mm
  ✔ Maximum weight < 300 Kg
  ✔ Maximum U metal weight: 250 kg
  ✔ Average burn up: 60 000 MWd/tU
  ✔ Minimum cooling time: 10 years
  ✔ maximum enrichment U-235: 3.5%
  ✔ Maximum decay heat: 1 kW

✔ EPR irradiated rods
Use of TN™ MIL cask

✓ Loading and unloading
  ✓ Dry or wet conditions
  ✓ Vertical or horizontal position

✓ Transportation
  ✓ Tied-down by 4 trunnions on a transport skid
  ✓ Loaded into an ISO container or inside tarpaulin
TN™ MIL cask
Based on TN106 Design 1/3
TN™ MIL cask
Based on TN106 Design 2/3

Protection plug
Revolving plug cover
Lid
Front cover
Orifice A cover
Revolving plug
Back cover
Pushed device
TN™MIL cask
Based on TN106 Design 3/3

- **Useful cavity length (UCL)**: 2200 mm
- **Internal diameter**: 203 mm
- **Overall length**:
  - with shock absorbers: 3624 mm
  - without shock absorbers: 2978 mm
- **Overall diameter**:
  - with shock absorbers: 1458 mm
  - without shock absorbers (including trunnions): 958 mm
- **Masses**
  - maximal content mass: 550 kg
  - loaded packaging with shock absorbers: 11 300 kg
TN™ MIL cask
Main characteristics

✓ **Useful cavity length (UCL):** ~5000 mm
✓ **Internal diameter:** 230 mm
✓ **Overall length:**
  ✓ with shock absorbers: ~6700 mm
  ✓ without shock absorbers: ~5600 mm
✓ **Overall diameter:**
  ✓ with shock absorbers: ~2000 mm
  ✓ without shock absorbers: ~1000 mm
✓ **Masses**
  ✓ maximal content mass: < 300 kg
  ✓ loaded packaging with shock absorbers: < 26 000 kg
TN™ MIL cask
Basic Design
Licensing phase

- Establishment of SAR: Up to end of 2006
- Review of SAR by French Authority: Up to end of 2007
- French approval certificate: January 2008
- Validation in Europe: Middle of 2008

Fabrication cask: During 2007

Ready to transport in France: Beginning of 2008
THE TN™106 ON THE TRAILOR
UNLOADING OF THE TN™106
TAPPING ROD OF THE TN™106
INSERTION OF THE INNER CONTAINER INTO THE HOTCELL
The TN™ MIL represents a big challenge

It should be in operation at the beginning of 2008

Thank you for your attention