MP197HB Transportation Cask

Responses to RSI Questions

Transnuclear Inc.

AREVA

Agenda

- Non-Proprietary Public Discussion
  - RSI 5-1
  - RSI 5-2
  - RSI 5-3
- Questions/ Comments
- Proprietary Discussion
  - RSI 2-1
  - RSI 7-1
  - RSI 2-2 and 3-1
  - RSI 2-3
  - RSI 3-2
- Closing Remarks

Shielding

- **RSI 5-1**
  - **Provide the calculations and results for the package surface dose rates under NCT**
- **Response**
  - **The dose rate results shown under the "Vehicle (Package) Surface" configuration are calculated on the accessible surface of the MP197HB Transportation Package**
  - **The maximum surface dose rate occurs with the 37PTH DSC fully loaded with design basis fuel on the side of the MP197HB transportation package. This dose rate is calculated to be 135 mrem/hr and is below both the 200 mrem/hr vehicle surface dose rate and the 1000 mrem/hr package surface dose rate (exclusive transport) regulatory limits as described in 10 CFR 71.47(b)**

Shielding

- **RSI 5-2**
  - **Provide benchmarking calculations for the assembly depletion analysis code TRITON for high burnup fuels**
- **Response**
  - **The benchmark evaluation was performed using publicly available data provided for**
    - fuel samples obtained from the Calvert Cliffs, TMI, and Takahama reactors,
    - high burnup fuel samples obtained from the Vandellos reactor, and
    - fuel samples obtained from Gosgen and GKN II reactors
  - **The ratio of the calculated to measured concentration of isotopes important to shielding – principal photon and neutron emitters – is employed to determine the associated dose rate uncertainty**
  - **Important isotopes for Gamma include Cs-134 (39 samples), Cs-137 (50 samples), Eu-154, Sm-147 (~ 30 samples), Ce-144, Ru-106 (~ 27 samples) and Sr-90 (9 samples) – these contribute greater than 90% of total gamma dose**

Shielding

- **Response to RSI 5-2 (continued)**
  - **Important isotopes for Neutron include Cm-242 (29 samples) and Cm-244 (37 samples)**
  - **Perform a trending analysis to establish that there is no bias in the isotopic concentration ratio predicted by TRITON as a function of burnup**
  - **Convert the concentrations into curies and determine the effect on dose rates using the response function method**
  - **All TRITON input/output files will be provided**

Shielding

- **RSI 5-3**
  - **Provide test results that demonstrate that, after all of the tests as prescribed in 10 CFR 71.73, the package neutron shield will be able to retain a uniform layer of 25% of the original thickness and the layer remains attached to the aluminum tube walls that are facing the fuel basket**
- **Response**
  - **The effectiveness of 25% of the neutron shielding materials under HAC is derived from**
    - Structural analysis of the neutron shield shell,
    - Puncture analysis of the package, and
    - Thermal performance test of the VYAL-B resin
  - **The net effect of the performance tests and the analytical results shows that the neutron shielding material will remain attached to the package following any postulated HAC except in the case of the puncture, for which the damage is localized and is already considered in the model (Figure A.5-23 of the SAR)**

Shielding

- **Response RSI 5-3 (continued)**
  - **TN has included the details of the thermal performance tests as part of the RAI-1 submittal for the MP197HB Licensing Process in 2010**
  - **A sensitivity analysis was performed assuming**
    - Complete loss of the MP197HB neutron shielding material
    - Maximum neutron source taken from Section A.5.2.5 of Chapter A.5.
    - Full length fuel in models described in Section A.5.3.1.2 of Chapter A.5 for HAC
  - **The maximum calculated dose rate at 1 m was 979 mrem/hr which is below the 10 CFR 71.51 limit of 1000 mrem/hr.**

Questions / Comments