NRC/NEI Meeting on Spent Fuel Storage and Transportation Licensing and Technical Issues

Meraj Rahimi
Senior Project Manager
Spent Fuel Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards

John Nakoski
Branch Chief
PWR Systems Branch
Division of Safety Systems
Office of Nuclear Reactor Regulation

Carl Withee
Senior Criticality & Shielding Engineer
Criticality Shielding and Heat Transfer Section
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards

Robert Einziger
Senior Materials Engineer
Structural and Materials Section
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards

NRC/NEI Meeting

- **Purpose**
  - To provide an opportunity for communicating Part 71 and 72 licensing and technical issues.

- **Expected Outcome**
  - To reach an understanding of the issues and the process for addressing them.

Issues for Today

- Criticality Control (RIS 2005-05)
- Burnup Credit
- Burnup Measurement
- Criticality Monitoring Requirement [10 CFR 72.124(c)]
- Damaged Fuel (ISG-1)
- High Burnup Fuel (ISG-11)

RIS 2005-05
(from November 10, 2005 mtg.)

- **Near-term** – review and grant exemptions and amendments to resolve issue on a case-by-case, plant-specific basis

- **Long-term** – In parallel, evaluate a 10 CFR 50.68 revision as part of FY 2006 Rulemaking plan

- **Long-term** – work on full burnup credit that may be used by cask designers

10 CFR 50.68

- Since Nov. 10, 2005, Staff Decided to Proceed with Technical Evaluation of Revising 10 CFR 50.68
- Staff is Currently Evaluating Technical Basis for Revising 10 CFR 50.68 with Respect to Subcriticality Requirements for Casks in Spent Fuel Pools
- If Technical Evaluation Justifies Subcriticality Requirements Under Part 71 and 72 for Casks Loading or Unloading in Spent Fuel Pools are Adequate Against Events in Spent Fuel Pools, 10 CFR 50.68 will be Revised, Through Rulemaking, to Exclude Casks from Being Subjected to 10 CFR 50.68 Provisions

STATUS OF BURNUP CREDIT

- DOE has Program to Expand BUC Data Base
- ISG-8R2 Provides for BUC with Actinides Only
- One Application In-House with Full BUC
- ANSI-8.27 Developing BUC Standard

EXPAND DATA BASE

- French Data*
- Belgian REBUS Program
- SNL Experiments*
- Improve Fission Product Nuclear Data*

* Part of DOE's Program

EXPAND SCOPE OF ISG-8

- Expand Scope Based on New Data and Technical Basis
- Draft Report on Actinide Plus Fission Products from ORNL Due 9/2006
- Peer Review and Public Comment
- Areas of Interest
  - Fission products
  - BWR fuel
  - MOX fuel

TRANSPORTATION APPLICATION

- Proprietary
- Includes Actinides and Fission Products
- Under Review
- Interest by Other Vendors

BURNUPCREDIT STANDARD ANS-8.27

- Industry and NRC Participation
- Body of Standard in Final Review
- Appendices to Give Implementation Examples

BURNUP MEASUREMENTS

- Historical Criticality Safety Basis
- Regulatory Position
- Reactor Records
- Misloadings
- Assessing Record Quality

CRITICALITY SAFETY BASIS IS MEASUREMENTS

- Relative, Not Absolute Measurements
- General Principle of Criticality Safety – Base Control on Measurements not Estimates
- Criticality Standards Refer to Inspection and Verification to Ensure Presence of Poisons
- Poison Plates are Measured

GUIDANCES & REQUIREMENT

- Reg Guide 3.71 – confirm BU with appropriate physical measurement
- IAEA's No. TS-R-1 – confirmatory measurement prior to shipment
- IAEA Advisory Material – no pre-measurement if assume fresh fuel
- ISG-8R2 – measure to confirm reactor records, sampling when justified

PROBLEMS WITH PLANT RECORDS

- Measurement Trials Found Unresolved Anomalies
- Measurement Trials found Some One Cycle Assemblies Listed as Spent
- Misload of Fuel Assemblies with a Short Cooling Time

ASSESSING RECORD QUALITY

- How to Establish the Accuracy of BUC Records – Basis
  - By assembly
  - By unit
  - Over time
- Appropriate Input Values
- Code Independent BU Values
  - Use same method

Criticality Monitoring Requirement

- 10 CFR 72.124(c)

  A criticality monitoring system shall be maintained in each area where special nuclear material is handled, used, or stored which energize clearly audible alarm signals if accidental criticality occurs. Underwater monitoring is not required when special nuclear material is handled or stored beneath water shielding. Monitoring of dry storage areas where special nuclear material is packaged in its stored configuration under a license issued under this subpart is not required.

Criticality Monitoring Requirement (cont.)

- NRC's August 1, 2000 letter to Holtec
  - Exception for transportation casks from Part 70.24 does not apply to casks licensed under Part 72

- NRC's April 26, 2005 letter to Southern Nuclear
  - Exemption request from 10 CFR 72.124(c) was denied
  - Provides guidance on the use of radiation monitoring for criticality monitoring

Criticality Monitoring Requirement (cont.)

- Staff's Position on Criticality Monitoring Requirement
  - Radiation monitoring may be used as the criticality monitoring system if it can be demonstrated to be capable of detecting any possible criticality events from spent fuel casks loading/unloading operation

Materials Issues

- ISG-1 - Damaged Fuel
  - Rev 1 draft under development
  - Definition primarily based on the function of the fuel cladding and structural components
  - Incorporation of ANSI N14.33 under review
- ISG-11 Rev 4 - Cladding Degradation Considerations
  - On hold until more data is obtained