

RIC 2006

Session W4GH

Spent Fuel Management

Used Fuel Storage and Transportation

**Steven P. Kraft
Senior Director,
Used Fuel Management
Nuclear Energy Institute
March 8, 2006**



Used Fuel Storage Data

- 34 ISFSIs currently operating at power reactor sites
- 792 dry storage systems (DSS) deployed containing 29,000 fuel assemblies comprising 8,590 MTU in dry storage
- 100 DSS deployed in 2005 alone
- 5 more ISFSIs coming “on-line” in 2006
- Nearly all DSS currently being put into service are canister-based, dual purpose certified under 10 CFR 71 and 72

Used Fuel Dry Storage Data (cont'd)

- Industry projects 100 additional DSS and 1000 MTU of used fuel to be placed into dry storage per year in the future
- 7 of 34 ISFSIs are at power plant sites with no operating reactor
- 3 of these 7 sites, comprising 101 DSS, no longer have spent fuel pools

Key Issues

- Criticality Control during Cask Loading
- Burnup Credit
- Moderator Exclusion
- Burnup Measurements
- Transportation of High Burnup Fuel
- Fuel-in-Air
- Regulatory Process

Criticality Control during Cask Loading

- 10 CFR 50.68 overlaps Part 72 criticality control rules for DSS loading in pool (RIS 2005-05)
- Conflicting regulations are causing an unnecessary burden for licensees
- 50.68 exemptions are appropriate based on Part 72 licensing work
 - Underlying intent of 50.68 rule met
- Industry encourages NRC priority on Part 50 rulemaking to resolve

Burnup Credit

- Currently no approved high-capacity, BUC-based used fuel transport package designs
- SFPO ISG-8 now permits limited burnup credit
- BUC or moderator exclusion required for transportation of high-capacity PWR packages
- Many high capacity DSS now without assurance of transportability due to lack of BUC
- New burnup data currently being evaluated for BUC analysis use by NRC-RES, ORNL, DOE, and EPRI

Moderator Exclusion

- §71.55(b) requires water in the containment system to be analyzed for criticality
- Most of today's used fuel transport packages include a welded canister inside a bolted-lid overpack designed to preclude water intrusion under all credible events
- BUC method may not provide enough analysis margin for shipment of all used
- Rule should be modified to recognize moderator exclusion by design for certain used fuel packages

Burnup Measurements

- NRC guidance in SFPO ISG-8 recommends burnup measurements as part of BUC package approval to ensure minimum burnup limits are met
- Industry believes burnup measurements are not necessary
- Industry uses reactor operating records alone to establish fuel burnup for other activities, such as dry storage (maximum burnup limit), core reloads, and wet rack storage

High Burnup Fuel

- Plants currently burning fuel to >50 GWD
- DSS and transport packages need to accommodate this used fuel
- Part 72 guidance in place for HBU used fuel – ensure PCT is $\leq 400^{\circ}\text{C}$
- Several storage CoCs permit HBU used fuel
- No broad-based NRC approval of HBU used fuel for transportation.
- HBU used fuel now being loaded in DSS and stored at ISFSIs but is not necessarily transportable

Damaged Fuel Definition

- Part 71 and 72 CoCs contain different definitions for damaged fuel due to changes in regulatory guidance
- Fuel is classified and loaded based on the CoC definition in effect at the time of loading
- Stable NRC damaged fuel definition (SFPO ISG-1) is needed
- NRC should consider adopting ANSI N14.33
- If Part 71 CoC definition changes, fuel loaded into DPCs as undamaged under Part 72 could possibly be considered damaged under Part 71 at time of shipment, making that package non-transportable

Fuel-in-Air

- SFPO draft ISG-22 imposes new requirements on licensees (via cask CoCs) to prevent fuel-air interaction
- Regulatory due process should be followed
 - Backfit analysis
- More technical research is required to determine whether this phenomenon is a concern for storage and transportation cask loading
- Industry and NRC should work together to define time-temperature profile

Process Issues

- A predictable regulatory process is needed
- Consistency of technical approaches between different parts of NRC is needed
 - e.g., burnup credit and burnup measurements
- Effective communication between NMSS and NRR is required
- Backfit rule needs to be more rigorously applied by NRC

Summary

- Several key issues still need appropriate NRC action
- Some DPCs are being loaded for storage that are not currently licensed for transport, awaiting resolution of these issues
- NEI Dry Storage Task Force is working with NRC to prioritize and manage resolution of the issues
- Technical differences between parts of the agency must be resolved