Facts about "Canning"
Used High Burnup (HBU) Nuclear Fuel

Executive Summary

There is no added safety benefit from canning HBU fuel and, in fact, it may have a negative effect. Canning provides no additional layer of protection to the public. Canning intact fuel assemblies can actually degrade the thermal performance of the storage canister by adding an extra layer of "insulation" around the fuel assemblies. In addition, adding canning to the loading process would result in more complex handling operations, thus would introduce higher radiation doses to workers and would be a violation of the industry's ALARA -- "as low as reasonably achievable" -- principles.

AREVA TN NUHOMS®

Canning of intact fuel assemblies is not required for storage or transportation with any NUHOMS® system. AREVA TN's license for NUHOMS® allows for storage and transport of three categories of fuel assemblies:

- Intact Fuel Assemblies (including HBU) -- handled normally and stored in dry shielded canister fuel compartments
- Damaged Fuel Assemblies (including HBU) -- damage is not severe so they can be handled normally and stored in canisters with Damaged Fuel End Caps on each individual fuel compartment
- Failed Fuel Assemblies (including HBU) – damage is severe so they cannot be handled normally, thus they are stored in specially-designed Failed Fuel Cans* to facilitate handling.

  *Failed Fuel Cans do not "contain" the failed fuel, they "confine" the failed fuel. Failed Fuel Cans do not do anything to prevent the release of fission gases, as they have holes in them to enable the draining of water.

Retrievability

NRC Requirements for Retrievability:

- Storage [10CFR Part 72]: Requires retrievability of spent fuel assemblies from a canister. Failed Fuel Cans are designed to enable retrieval of assemblies that cannot be handled by any other means.

- Transportation [10 CFR Part 71]: Does not require retrievability but requires that the geometry of the fuel not be substantially altered under normal conditions of transport.

- If the HBU fuel is not damaged then it can be retrieved using standard equipment. If the HBU fuel is damaged, the use of Damaged Fuel End Caps, as noted above, enables it to meet the NRC requirements for retrievability. The use of Damaged Fuel End Caps in each fuel compartment achieves the same goal as canning the fuel assembly. The NUHOMS® 32PTH2 design of fuel compartments with Damaged Fuel End Caps confines the damaged fuel assembly in an individual fuel compartment.

Industry Perspective on High Burnup Fuel (HBU)

- Maine Yankee loaded HBU fuel assemblies in Failed Fuel Cans as a precaution simply because in 2001 there was uncertainly on how to treat HBU in storage and transport.

- Zion is considering placing HBU fuel assemblies in Failed Fuel Cans as they have not yet licensed their canister for HBU transportation, thus their decision is a conservative step that is meant to ensure they meet the NRC requirement for retrievability for transportation.

- Unlike the dry storage systems designs at Maine Yankee or at Zion, AREVA TN systems are already licensed for the transportation of HBU fuel, thus there is no need to "can" HBU fuel assemblies in the AREVA TN NUHOMS® system.

Impact of Use of Failed Fuel Cans on Technologies

NUHOMS® 24PT4
- Failed Fuel Can will affect structural, thermal and operational design function
- Will require design and licensing changes, thus delaying schedule
- Would have an impact on the ISFSI pad footprint and fuel pool offload completion date

NUHOMS® 32PTH2
- Can be modified to accommodate individual separate Failed Fuel Cans for HBU fuel
- Basket design would be modified, impacting decay heat rejection capability
- Amendment would be submitted to NRC for review/approval, impacting cost/schedule
- Impact on cost, schedule, ISFSI pad footprint and fuel pool offload completion date
- Use of Damaged Fuel End Caps offers the same functionality to store damaged HBU fuel assemblies without delays and costs of license submittal and negative impact on system performance.

Vertical Storage
- Failed Fuel Can will have a significant impact on vertical systems
- Addition of a "can" will reduce heat rejection and require longer cooling times
- Will impede convection heat transfer significantly more than NUHOMS® 32PTH2**

**The NUHOMS® 32PTH2 canister design is conservative and does not take credit for closed cavity convection in its licensing. Only conduction heat transfer is assumed in the NUHOMS® 32PTH2 heat transfer analysis. This is in contrast to vertical systems that do take credit for closed cavity heat convection in the canister cavity in their license, thus when “canned” the convection heat transfer properties are severely impeded. Thus the used fuel would require much longer cooling times if HBU fuel had to be placed in a Failed Fuel Can in a vertical system.

Conclusion

The NUHOMS® system technology has been developed to ensure safe storage and transportation of intact, damaged and failed HBU fuel assemblies, thus there is no need for the canning of any intact used fuel at SONGS. Used fuel storage safety is not enhanced by canning and, in fact, canning would reduce safety margins by degrading thermal performance of the canisters and requiring additional handling that would drive higher dose rates for those handling the fuel. In addition, the canning of fuel would result in used fuel pool unloading scheduling delays.

SONGS has state-of-the-art used fuel storage systems that have been developed by AREVA, the world leader in used fuel storage and transportation, with more than 40 years of experience … and an impeccable safety record.