UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
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Questions on Topics of the Summer 2014 Board Meeting
Wednesday August 6, 2014

[This document was provided to the U.S. Department of Energy (DOE) to develop the topics and content for the meeting and the questions are based on the U.S. Nuclear Waste Technical Review Board staff analysis of the management and disposal of DOE spent nuclear fuel.]

The purpose of the questions below is to give DOE a sense of the types of information the Board is seeking on each topic of the agenda.

Use of Multipurpose Canisters for DOE SNF

For the Board's November 18-19, 2013, workshop titled, "Technical Workshop on the Impacts of Dry-Storage Canister Designs on Future Handling, Storage, Transportation and Geologic Disposal of Spent Nuclear Fuel in the United States," the Board requested DOE to address the topic relative to both commercial SNF and DOE SNF. At that time, DOE chose to focus on commercial spent nuclear fuel (SNF), so at this meeting the Board wishes to address experience of and plans for development of standardized/multipurpose canisters for DOE SNF.

For the DOE standard canister and the multi-canister overpack (MCO), and the Shippingport Spent Fuel Canisters:

1) What is the status and what are the general characteristics of each type of multi-purpose canister and how many of each type are expected to be used for DOE SNF?
2) How does the storage container interface with any transportation overpack?
3) Which modes of transportation (truck, rail, barge or some combination) can be used and would any specialized transportation infrastructure be needed?
4) Is additional design, testing, and analysis needed before the containers can be transported, or used for disposal? (For example, it appears that DOE may still need to develop designs for handling the MCO and complete operational safety analyses before it could be incorporated into the Yucca Mountain repository design.)
5) Could each type of multi-purpose canister be used for disposal in the other rock types and what work has been done on analyzing this question? (See Bonano presentation at Board workshop as an example of assessing disposal options.)
6) Has each type of container been certified by NRC for transportation or are there plans to certify the containers for transport, if so when?
7) How many of each type of container are used for storage?
8) What, if any, DOE SNF will not be loaded into standardized/multi-purpose canisters, and how would that material be transported to a repository?

Preparation of Spent Nuclear Fuels for Offsite Transportation and Disposal

1) How will DOE determine when SNF currently in dry storage needs to be dried and stored in an inert atmosphere?
2) How will DOE determine what preparatory processes are needed, and do any preparation techniques still need to be developed?
3) How will DOE determine that the SNF is dry enough to meet potential NRC transportation restrictions for combustible gas content?

National Laboratory Studies Supporting the High Burnup Dry Storage Cask Research and Development Project

1) What specific studies are planned and what are the objectives for the studies?
2) What will be measured, and how and when will the studies be completed?
3) What instruments are being developed to meet the goals of the project?
4) How will the studies support DOE's responsibilities and operations for transport and disposal of SNF? For example:
    - will the results of these studies help DOE identify any constraints that may impact repository operations such as packaging SNF into a waste package;
    - will the results of these studies inform the potential impacts, if any, on disposal in other generic rock types?
5) How will the results from these "storage" studies inform any DOE effort to develop a standardized transportation, aging, and disposal canister for commercial SNF?

DOE, Office of Environmental Management (EM) - Management of Spent Nuclear Fuel and High-Level Waste at INL
DOE, Office of Nuclear Energy (NE) - Management of Spent Nuclear Fuel and High-Level Waste at INL

It may be useful to use certain DOE SNF types as examples to address (or walk through) EM and NE management of SNF and HLW. In particular, aluminum-clad SNF [i.e, Advance Test Reactor (ATR) at Idaho National Laboratory (INL)] and sodium-bonded SNF at INL are types of SNF that DOE can use to illustrate its management and how the system for its management is integrated across DOE offices and sites such that the SNF and HLW will be accepted for disposal, and ultimately disposed.

1) For both NE and EM what SNF and HLW do they manage? For example:
    - what SNF and HLW does NE manage and how is it managed so that it can be accepted for disposal in a geologic repository (e.g., Gelles' presentation to the Board describes a DOE document hierarchy, if implemented, that would lead to waste forms that would be accepted for disposal by the former Office of Civilian Radioactive Waste Management – however the requirements framework appears to only apply to EM)?
    - for NE-managed SNF and HLW when does it become EM's responsibility for managing the SNF and HLW such that the further EM waste management activities will be lead to the waste being accepted for disposal?
    - as a specific example, do both NE and EM manage ATR SNF and what determines how and where it is managed and how that aluminum-based SNF will be either be prepared for transportation and disposal at a repository or transferred to Savannah River Site (SRS) in exchange for non-aluminum-clad SNF?
    - as another specific example, who manages the sodium-bonded SNF, who manages the treatment of the SNF and creation of the HLW products and how is that process managed such that the HLW products will be accepted (both in terms of waste form characteristics and waste container characteristics) for geologic disposal?
2) For both EM and NE, what are the challenges for managing SNF and HLW such that the wastes can be disposed, and what options or opportunities are available for addressing the challenges in a systematic and integrated fashion? For example, completing the intra-site transfer of aluminum- and non-aluminum-clad SNF could be challenging (both in terms of storage at SRS and INL and interstate transportation of degraded SNF), yet not completing the transfer can raise other challenges to the disposition of these wastes.
3) For EM, has there been any change in DOE's decision to manage the sodium bearing waste as transuranic- contaminated waste?
4) For EM, has the classification of sodium bearing waste been formalized?

5) For EM, what is the status and schedule of the Integrated Waste Treatment Unit pertaining to both steam reforming the sodium bearing waste and hot isostatic pressing of the calcine HLW?

Management of Aging Storage Facilities and SNF (not just at INL)

1) How does DOE identify and plan for actions that are needed for preventing problems from occurring during the packaging or repackaging, offsite transportation, and storage or disposal of SNF following extended periods of storage at the DOE sites?
2) Given the uncertainties associated with the beginning of operations of a repository or out of state storage facility, what aging management programs and activities is DOE implementing?
3) What components are subject to aging management (e.g., building system, the storage containers, the SNF itself)?
4) How do those programs inform DOE of the need to repackage the SNF?
5) How are DOE's efforts linked to, or learning from, NRC's ongoing efforts to update its framework for aging management for SNF storage?

Transportation of Damaged SNF

1) What experience has DOE had transporting damaged SNF in extended campaigns with multiple packages (e.g., Three Mile Island Unit 2 from Pennsylvania to INL [Test Area North (TAN)] and then from TAN to CPP-1774; K-Basin at Hanford; and Receiving Basin for Offsite Fuels Deinventory Project at SRS), and what were the challenges?
2) What lessons has DOE learned from transporting damaged SNF that can inform its efforts to certify multipurpose canisters for transporting damaged SNF and to complete the transfer of non-aluminum-clad SNF from SRS to INL and the aluminum-clad SNF at INL to SRS?
3) Are there other particular features of DOE SNF that present additional challenges with respect to the storage and transport of damaged SNF compared with commercial SNF?