



UNITED STATES  
NUCLEAR WASTE TECHNICAL REVIEW BOARD  
2300 Clarendon Boulevard, Suite 1300  
Arlington, VA 22201-3367

**AGENDA**  
**FALL 2019 BOARD MEETING**  
**TUESDAY, NOVEMBER 19, 2019**

EMBASSY SUITES ALEXANDRIA HOTEL  
1900 DIAGONAL ROAD  
ALEXANDRIA, VA 22314  
TEL: (703) 684-5900

- 8:00 a.m. Call to Order and Introductory Statement**  
Dr. Jean Bahr, Board Chair
- 8:15 a.m. Department of Energy (DOE) Opening Remarks – DOE’s Research and Development (R&D) Related to Packaging, Drying, and Storing Spent Nuclear Fuel (SNF).**  
Dr. William Boyle, DOE, Office of Nuclear Energy (DOE-NE)
- 8:45 a.m. Questions/Discussion**
- 9:00 a.m. High Burnup Dry Storage Cask Research and Development Project (HDRP)—Next Steps.**  
Mr. Ned Larson, DOE-NE
- a. Brief overview of the HDRP, with a focus on fuel performance.
  - b. Brief update on sister rod examinations.
    - 1) Are recently-obtained data on sister rods consistent with earlier data showing that the structural integrity of high burnup SNF is not challenged by loads experienced in normal conditions of transport?
    - 2) What work is planned to address accident conditions?
    - 3) Are there any unexpected results from the destructive examinations of sister rods conducted this year? If so, please explain.
    - 4) How are the experimental results being incorporated into predictive fuel performance models, so that fuel performance for conditions different than those experienced by the sister rods can be evaluated?

- c. Need for moisture measurements from cask gas samples.
  - 1) Given the number of uncertainties in the moisture measurements from the HDRP test cask, what plans are being made to obtain moisture samples from other SNF casks?
- d. Briefly describe plans for preparing and licensing the HDRP cask for transport.
- e. Briefly describe plans for opening and unloading the HDRP cask and examining the SNF.

**9:30 a.m.** Questions/Discussion

**9:45 a.m.** **Break**

**10:00 a.m.** **Dry-Storage of Commercial SNF – Thermal Analysis**  
 Mr. Dave Richmond, Pacific Northwest National Laboratory,  
 Dr. Sam Durbin, Sandia National Laboratories

- a. DOE-sponsored work on thermal modeling of SNF casks and canisters, including work to model the HDRP test cask.
  - 1) Please explain the most likely causes of the model(s) overpredicting temperatures.
  - 2) What model improvements have been made to account for the cause(s) of temperature overprediction?
  - 3) What future verification and validation work is planned to improve the understanding of the uncertainty in temperature predictions across the fleet of commercial SNF cask systems?
- b. R&D related to dry-storage canisters in the horizontal configuration at Sandia National Laboratories (SNL): test setup; results to date; validation of thermal-hydraulic computer models.
  - 1) Are there plans to use more than one thermal-hydraulic model to predict temperatures in the horizontal canister tests? Please explain.
  - 2) When modeling SNF canisters in the horizontal configuration, what are the sources of the largest uncertainties in the temperature predictions?
  - 3) Testing in the lab provides a good basis for checking thermal-hydraulic models, but are there plans to validate the model(s) against a loaded SNF canister in dry storage in the horizontal configuration to improve the understanding of the uncertainty in temperature predictions across the fleet of commercial SNF cask systems?

- c. Follow-on coordination with the Electric Power Research Institute and the Nuclear Regulatory Commission on thermal modeling.
  - 1) Please explain the plans for follow-on modeling efforts
  - 2) Please explain the main focus and expected outcome of the expert elicitation process regarding temperatures in commercial SNF casks and canisters. What is the schedule for the effort?

**10:45 a.m.** Questions/Discussion

**11:00 a.m.** **Key Points from the Board Report on Management and Disposal of DOE SNF; Board Recommendations Related to the DOE Standardized Canister and on SNF Drying**  
 Dr. Bret Leslie, U.S. Nuclear Waste Technical Review Board (NWTRB)

- a. Summary of DOE SNF and its management and plans for disposal.
- b. Purpose and design of the DOE Standardized Canister.
- c. Board findings and recommendations related to development of the DOE Standardized Canister and to SNF drying.

**11:30 a.m.** Questions/Discussion

**11:45 a.m.** **Public Comment**

**12:00 p.m.** **Lunch**

**1:00 p.m.** **Development of the DOE Standardized Canister for DOE-Managed SNF**  
 Dr. Josh Jarrell, Idaho National Laboratory (INL)

- a. DOE's efforts to develop the DOE Standardized Canister.
  - 1) What is the schedule for completion of the DOE Standardized Canister that supports SNF deadlines in the Idaho Settlement Agreement? What are the next major milestones?
  - 2) What transportation cask or overpack is being considered for transporting the DOE Standardized Canister?
- b. Evaluation of neutron absorbers for the DOE Standardized Canister.
  - 1) New borated stainless steel absorbers have been assessed for use in canisters with SNF from the Advanced Test Reactor (ATR). Will this proposed design feature be acceptable for disposal? Will use of gadolinium filler material still be required for some DOE SNF?

- c. Evaluation of loading DOE Standardized Canisters at the CPP-603 facility.
  - 1) Approximately what percentage of the INL inventory of SNF could be loaded into canisters at the CPP-603 facility?
  - 2) If another SNF loading facility is needed at INL, what is the needed capacity of the facility and how soon would it have to be operational to support SNF removal from INL, in accordance with the Idaho Settlement Agreement?

**1:30 p.m.** Questions/Discussion

**1:45 p.m.** **DOE-Office of Environmental Management-Sponsored Research on Long-Term Dry Storage of Aluminum-Clad SNF**  
Dr. Mike Connolly, Idaho National Laboratory

- a. Overview of current DOE Office of Environmental Management (DOE-EM) research on the long term dry storage of Al-clad SNF.
  - 1) What are the key issues that must be understood, and what is our current state of understanding to ensure the safe long-term dry storage of Al-clad SNF? How is DOE addressing the knowledge gaps?
  - 2) To date, have there been any unusual or unexpected results from your research? Please explain.
  - 3) How do the results of the current research compare to the data obtained during drying and dry-storage of Al-clad SNF removed from the K-Basins at Hanford?
- b. DOE-EM planned follow-on research.
  - 1) What are the targeted technical areas for follow-on research?
  - 2) Please explain efforts to conduct drying tests on Al-clad SNF.

**2:30 p.m.** Questions/Discussion

**2:45 p.m.** **Break**

**3:00 p.m.** **Research in the United Kingdom on SNF and Implications for Aluminum-clad SNF**  
Dr. Paul Standring, Sellafield, Ltd. (United Kingdom)

- a. Overview of SNF inventory, drying, and storage in the UK
  - 1) Please describe UK Al-clad fuel features and contrast those with DOE Al-clad fuel features.
  - 2) Please explain how much Al-clad SNF is being managed in the UK. Will it be reprocessed or disposed of directly?
  - 3) What is the schedule for storing and, ultimately, disposing of the Al-clad SNF?

- b. Storage of Magnox SNF in sealed or vented systems.
  - 1) How is Magnox SNF similar to Al-clad SNF? How is it different?
  - 2) How will lessons learned from the management of Magnox SNF be applied to the management of Al-clad SNF?
  
- c. Uranium-hydride formation, hydrogen generation, and modelling to support the safety case for SNF storage.
  - 1) Please explain how the study of the formation of uranium hydride in Magnox SNF can inform the study of Al-clad SNF?
  - 2) Please explain the extent and applicability of the computer models that have been developed in support of the safety case for Magnox SNF. Will these models be applicable to Al-clad SNF?
  - 3) Are the data gathered to date consistent with the data obtained from other studies? Please explain.

**3:45 p.m.** Questions/Discussion

**4:00 p.m.** **Panel Discussion – R&D on Drying and Dry-Storage of Aluminum-clad SNF**

Moderator: Dr. Bret Leslie (NWTRB)

Panelists: Dr. Josh Jarrell (INL); Dr. Mike Connolly (INL); Dr. Paul Standring (Sellafield, Ltd., United Kingdom);

**4:45 p.m.** **Public Comment**

**5:00 p.m.** **Adjourn**