



U.S. Nuclear Waste Technical Review Board www.nwtrb.gov

The Impacts of Dry-Storage Canister Designs on Spent Nuclear Fuel Handling, Storage, Transportation and Disposal In the United States

Presented to:
NTSF 2014 Annual Meeting

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The Nuclear Waste Technical Review Board

- Established by the 1987 amendments to the Nuclear Waste Policy Act to:
 - Evaluate the "technical and scientific validity" of DOE activities related to implementing the NWPA, including
 - Transportation, packaging, and storage of spent nuclear fuel (SNF) and high-level radioactive waste (HLW)
 - Site characterization, design, and development of facilities for disposing of such wastes.
- Required by law to report its findings, conclusions, and recommendations at least twice each year to Congress and the Secretary of Energy.
- Eleven Board members:
 - Technical and scientific experts
 - Nominated by the National Academy of Sciences; appointed by the President
 - Serve on a part-time basis for four-year terms.
- Board documents:
 - Reports, correspondence, meeting transcripts and materials, congressional testimony, etc. can be found at www.nwtrb.gov
 - Basis for Board perspectives on SNF and HLW program



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The Canister Dilemma

- Dry Storage in Large Canisters/Casks:
 - Originally intended as short-term on-site storage capacity
 - Driven by current-year economics of individual utilities
 - Wide range of designs – some not intended for transportation
 - With passage of time, now the long-term storage norm
 - No basis for alternative strategy by utilities
- Some DOE SNF also currently stored in large containers
- Repository disposal:
 - National program: DOE responsibility
 - May need to accommodate all types of SNF and HLW
 - Disposal container not defined yet
- Is it a big deal?
 - ~65,000 MTU SNF in the US now; ~20,000 MTU in dry storage
 - ~1,900 large dry storage canisters/casks loaded; ~3,000 by 2020
 - 150,000 MTU SNF before a repository becomes operational
 - Require ~12,000 "large" or ~80,000 "small" canisters/casks



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The Canister Dilemma (2)

Direct disposal would mean:

- Transportation of existing large canisters/casks:
 - Licensing dry-storage canisters for transportation
 - Design/procurement of canister overpacks
 - Primarily rail and barge shipments
 - Less routing options available than for repackaging case
 - Complicated logistics, potentially including intermodal transfers
- At the repository site – handling, emplacement and post-closure:
 - Large/heavy packages
 - Higher heat loads
 - More activity
 - Higher fissile content

May particularly affect long-term (predicted) repository performance



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The Canister Dilemma (3)

Repackaging would mean:

- New facilities
- More fuel handling
- More dose
- More LLW
- Transportation of small(er) containers
 - More transportation operations – if repackaging is done at utility sites or an interim storage facility
 - Wider selection of transportation routes than direct disposal case
 - (Possibly) less complicated logistics
- At the Repository Site:
 - Small(er)/light(er) packages
 - More disposal packages at the repository
 - More emplacement operations



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Implications of Canister Designs

- Workshop – November 2013, Washington, DC.
 - Driven by Board concern: repackaging and direct disposal each have significant implications for SNF management
 - Provide input for Board report
 - Broad attendance by wide range of interested parties
 - Some key points raised in open discussion:
 - The US SNF management program needs to be integrated
 - The regulatory requirements for different stages of the program need to be aligned
 - Repackaging of the SNF already in large dry-storage canisters would be a major undertaking; and increasing with time
 - Repackaging at operating utility sites would interfere with normal operations
 - Direct disposal may limit geological environments suitable for repository siting
- Board Report planned for 2014
 - Input from Board analyses, industry discussions, workshop, etc.



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Board Meetings

- **Most Recent:**

- Spring 2014: March 19, 2014, Albuquerque, NM: Salt as a repository medium for disposal of SNF and HLW

- **Planned:**

- Summer 2014: August 6, 2014, Idaho Falls, ID: Management of SNF on DOE sites
- Fall 2014: October 29, 2014, Augusta, GA: Processing of SNF, vitrification of HLW and storage of vitrified product at Savannah River Site
- Spring 2015: February 24-25, 2015(TBC), Washington, DC: Topic TBD



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