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

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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

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

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:
  - Smaller/lighter packages
  - More disposal packages at the repository
  - More emplacement operations

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.
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(TBD), Washington, DC: Topic TBD