U.S. Nuclear Waste Technical Review Board: Overview and Activities Related to the Storage, Transportation and Disposal of Spent Nuclear Fuel

Presented to:

Nevada Legislative Committee on High-Level Radioactive Waste

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**EXHIBIT D – HLRW – Document consists of 14 slides.
Entire Exhibit provided. Meeting Date: 02-21-14**

The Board's Statutory Mandate

- Established by the 1987 amendments to the Nuclear Waste Policy Act (NWPA).
- The Board evaluates the "technical and scientific validity" of U.S. Department of Energy (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.
- These activities fall under the Board's technical peer-review mandate, wherever in DOE they are undertaken
- The Board is required by law to report its findings, conclusions, and recommendations at least twice each year to the U.S. Congress and the U.S. Secretary of Energy.

About the Board

- Independent federal agency in the Executive Branch
- 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 staggered four-year terms.
- By law, has access to draft DOE documents to allow recommendations to be made during decision-making, not after the fact
- Holds public meetings
- Has fact-finding discussions
- Board documents (meeting transcripts and materials, reports, correspondence, congressional testimony, etc.) can be found at *www.nwtrb.gov* .

Board Priority Goals

- The Board's review of the technical and scientific validity of DOE activities, includes:
  - Activities that were formerly the responsibilities of DOE-RW, following transfer to DOE-NE and DOE-EM
  - The transfer of YMP records to DOE-LM for archiving
  - Activities undertaken by DOE-EM related to defense SNF and HLW
  - Research and development and activities being undertaken by DOE-NE to support potential future recycling and introduction of advanced fuel cycles.
- In response to changes in DOE's focus in 2010, the Board also defined new priority goals, to:
  - Compile objective information and complete its own analyses to support the technical review of DOE activities
  - Update its information on, and assess the lessons learned from, experiences gained from the U.S. radioactive waste management program and programs in other countries

Geologic Disposal: The U.S. is Not Alone

- Disposal of SNF and/or HLW in deep underground repository – internationally accepted concept
- Most countries with nuclear power programs have repository plans for SNF and/or HLW
- Many countries have had resets in repository programs
- No SNF or HLW disposed of to date
- No repository operational for SNF or HLW
- No repository licensed for SNF or HLW
- Reprocessing is not a final solution
- Long-term storage of SNF and/or HLW is today's reality

Progress Is Possible…

- Sweden:
  - Osthammar/Granite
  - License application submitted 2011 – under review by regulator
  - SKB/KBS-3 concept, small SNF canisters (4 PWR/9 BWR)
- Finland:
  - Olkiluoto/Granite
  - License application submitted 2012 – under review by regulator
  - SKB/KBS-3 concept, small SNF canisters (4 PWR/9 BWR)
- France:
  - Bure/Argillite (Clay)
  - License application scheduled for submission to parliament 2015
  - Vitrified HLW containers, now adding PWR MOX SNF
- Belgium, Canada, China, Germany, Japan, Korea, Russia, Spain, Switzerland, United Kingdom:
  - Various stages in siting and repository development

Looking for Common Ground

- Sweden, Finland and France:
  - All used consent-based site selection processes
  - All have single-purpose implementers
  - All have long-term, multi-year assured budgets
  - All have stable political support
  - All have high staff retention rates
  - All have focused on:
    - Demonstration of long-term safety, rather than just meeting regulatory requirements
    - Establishing and maintaining public acceptance
- However:
  - None of these factors guarantees success
  - Sweden and France initially had “resets”
  - Each program has its own individual characteristics

The U.S. SNF 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
  - May need to accommodate all fuel types 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 US SNF Dilemma (2)

Repackaging would mean:

- New facilities
- More fuel handling
- More dose to operations staff
- More LLW
- More transportation operations – depending on repackaging location
- More disposal packages
- More emplacement operations

The US SNF Dilemma (3)

Direct disposal would mean:

- Transportation of large canisters/casks:
  - Canister overpacks
  - Licensing
  - Logistics
- 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

Implications of Canister Designs

- Board Report planned for 2014
- Workshop – November 2013, Washington, DC.
  - Driven by Board concern: repackaging and direct disposal each have significant implications for SNF management
  - Provide input for 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

Related Board Reports, etc.

- Survey of National Programs for Managing High-Level Radioactive Waste and Spent Nuclear Fuel: 2009 – update planned for 2014.
- Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel - Executive Summary: 2010.
- Experience Gained from Programs to Manage High-Level Radioactive Waste and Spent Nuclear Fuel in the United States and Other Countries: 2011.
- DOE Activities to Preserve Yucca Mountain Repository Project Records: 2013.

Other Related Board Documents

- Testimony before House Appropriations Subcommittee on Energy and Water Development by Chairman Ewing: April 2013
- Letter to Chairman of House Appropriations Subcommittee on Energy and Water Development by Chairman Ewing: September 2013
- Factsheet on Deep Borehole Disposal of SNF and HLW: August 2013

Board Meetings in 2014

- Wednesday March 19, 2014
  - Location: Albuquerque, NM
  - Theme: DOE R&D activities related to salt as a geological medium for disposal of SNF and HLW
- Wednesday August 6, 2014
  - Location: Idaho Falls, ID
  - Theme (TBC): Management of SNF and HLW at Idaho National Laboratory; management of DOE SNF, classification of DOE wastes
- Wednesday October 29, 2014
  - Location: Augusta, GA
  - Theme (TBC): Management of SNF and HLW at Savannah River Site