Overview of Spent Fuel Management Programs

Presented to:
INMM 32nd Spent Fuel Management Seminar

Presented By:
Nigel Mote, Executive Director

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Washington, DC
About the Board

The U.S. Nuclear Waste Technical Review Board (Board) was established by Congress as an independent federal agency in the 1987 amendments to the Nuclear Waste Policy Act (NWPA).
About the Board

- The Board evaluates the “technical and scientific validity” of U.S. Department of Energy (DOE) activities related to implementing the NWPA, wherever in DOE the activities are undertaken.

- DOE activities include:
  - Packaging of spent nuclear fuel (SNF) and high-level radioactive waste (HLW) and transportation of the wastes to a storage or disposal facility.
  - Site characterization, design, and development of facilities for disposing of SNF or HLW.
About the Board

Eleven Board members:
- Candidates nominated by National Academy of Sciences solely on the basis of eminence and expertise
- Appointed by the President
- Serve part time for four-year, staggered terms
About the Board

• Required to report its findings, conclusions, and recommendations to the U.S. Congress and the Secretary of Energy

• By law, has access to draft DOE documents – allows Board recommendations to be made during decision-making, not after the fact

• Provides congressional testimony at the invitation of Congress
About the Board

- Holds public meetings several times per year in different geographic locations in the United States – meetings are typically webcast
- Provides technical and scientific comments in letters to DOE following public meetings
- Makes all official documents (meeting transcripts and materials, reports, correspondence, congressional testimony, etc.) available on its website: www.nwtrb.gov
Board Members

- Jean Bahr, Ph.D., Chair – University of Wisconsin, Madison
- Steven M. Becker, Ph.D. – Old Dominion University
- Susan L. Brantley, Ph.D. – Pennsylvania State University
- Allen G. Croff, MBA – Vanderbilt University
- Rodney C. Ewing, Ph.D., (Former Chairman) – Stanford University (resigned January 2017)
- Efi Foufoula-Georgiou, Ph.D. – University of California, Irvine
- Tissa Illangasekare, Ph.D. – Colorado School of Mines (President nominated January 2017)
- Linda K. Nozick, Ph.D. – Cornell University
- Kenneth Lee Peddicord, Ph.D. – Texas A&M University
- Paul J. Turinsky, Ph.D. – North Carolina State University
- Mary Lou Zoback, Ph.D. – Stanford University
Board Meetings in 2016 and 2017

• Winter Meeting – February 17, 2016
  ➢ Location: Knoxville, Tennessee
  ➢ Topic: R&D on High Burnup Spent Nuclear Fuel Performance During Storage and Transportation

• Summer Meeting – August 24, 2016
  ➢ Location: Washington, D.C.
  ➢ Topics: Developing an Integrated Program for Management and Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste

• Summer Meeting – June 21, 2017
  • Location: Richland, WA
  • Topic: Corrosion of High-Level Radioactive Waste Borosilicate Glass

• Fall Meeting – October 11, 2017
  • Location: Washington, DC
  • Topic TBD
Recent Board Reports

Board Reports in Preparation

- Management of DOE-Owned Spent Nuclear Fuel at: the Hanford site, Washington State; Savannah River Site, South Carolina; Idaho National Laboratory, Idaho; and Fort St. Vrain, Colorado.

- High Burnup Spent Fuel – Characteristics and Performance During Extended Storage and Transportation

- Impacts of Dry-Storage Canister Size on Storage, Transportation, and Disposal of Spent Nuclear Fuel

- Corrosion of High-Level Radioactive Waste Borosilicate Glass

- Comparison of National Safety Cases for Managing High-Level Radioactive Waste and Spent Nuclear Fuel
# SNF Management Programs

<table>
<thead>
<tr>
<th>Country</th>
<th>Spent Nuclear Fuel Storage</th>
<th>Transport</th>
<th>Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wet</td>
<td>Dry</td>
<td></td>
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<tr>
<td>Belgium</td>
<td>At reactor</td>
<td>At reactor – bolted casks</td>
<td>Bolted casks</td>
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<tr>
<td>Canada</td>
<td>At reactor</td>
<td>At reactor – vault</td>
<td>Bolted casks</td>
</tr>
<tr>
<td>China</td>
<td>At reactor</td>
<td>At reprocessing facility</td>
<td>Bolted casks</td>
</tr>
<tr>
<td>Finland</td>
<td>At reactor</td>
<td></td>
<td>Bolted casks</td>
</tr>
<tr>
<td>France</td>
<td>At reactor</td>
<td>At reprocessing facility</td>
<td>Bolted casks</td>
</tr>
<tr>
<td>Germany</td>
<td>At reactor</td>
<td>At reactor – CISF</td>
<td>Bolted casks</td>
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URL – Underground Research Laboratory  
CISF – Centralized interim storage facility
## SNF Management Programs

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<tr>
<td>Japan</td>
<td>At reactor</td>
<td>At CISF</td>
<td>Bolted casks</td>
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<tr>
<td>Rep. of Korea</td>
<td>At reactor</td>
<td></td>
<td>Bolted casks</td>
</tr>
<tr>
<td>Spain</td>
<td>At reactor</td>
<td>At reactor CISF (on hold)</td>
<td>Bolted casks</td>
</tr>
<tr>
<td>Sweden</td>
<td>At reactor</td>
<td>At CISF</td>
<td>Bolted casks</td>
</tr>
<tr>
<td>Switzerland</td>
<td>At reactor Separate pool on reactor site</td>
<td>At reactor At CISF</td>
<td>Bolted casks</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>At reactor At reprocessing site</td>
<td>At reactor – AGR At reactor – PWR (under construction)</td>
<td>Bolted casks</td>
</tr>
<tr>
<td>United States</td>
<td>At reactor At former reprocessing site</td>
<td>At reactor – mainly welded canisters At CISF (planned)</td>
<td>Canisters in bolted casks, Welded casks</td>
</tr>
</tbody>
</table>

CISF – Centralized Interim Storage Facility
R&D to Support Extended SNF Storage

• International Programs, e.g.:
  – IAEA SPAR IV
  – EPRI/ESCP

• National programs in many countries

• Focus on:
  – Facility degradation/aging management
  – Cask/canister drying
  – Bolt and seal performance
  – Fuel assembly/cladding/fuel performance, e.g.:
    • Impact of hydride reorientation
    • Impact of high burnup fuel
  – Damaged fuel handling
  – Computer modeling (thermal, fuel, structural)