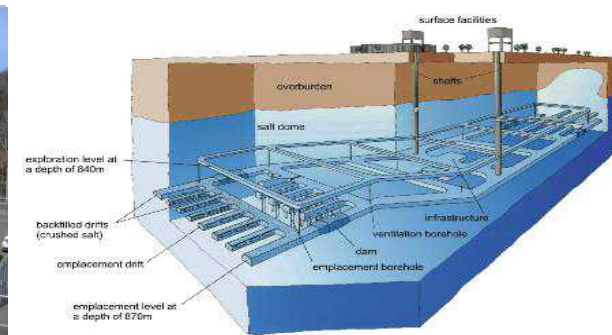
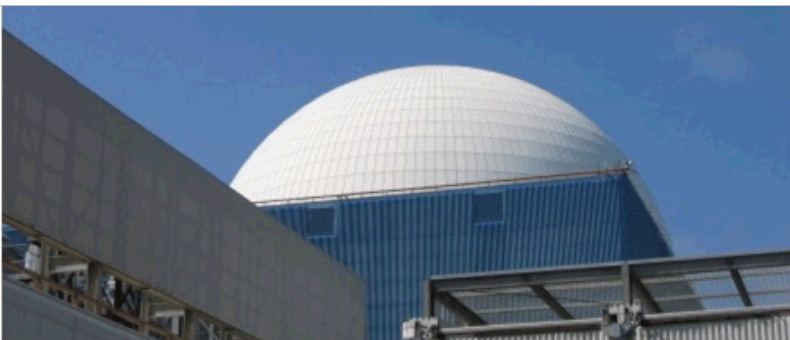


*Exceptional service in the national interest*



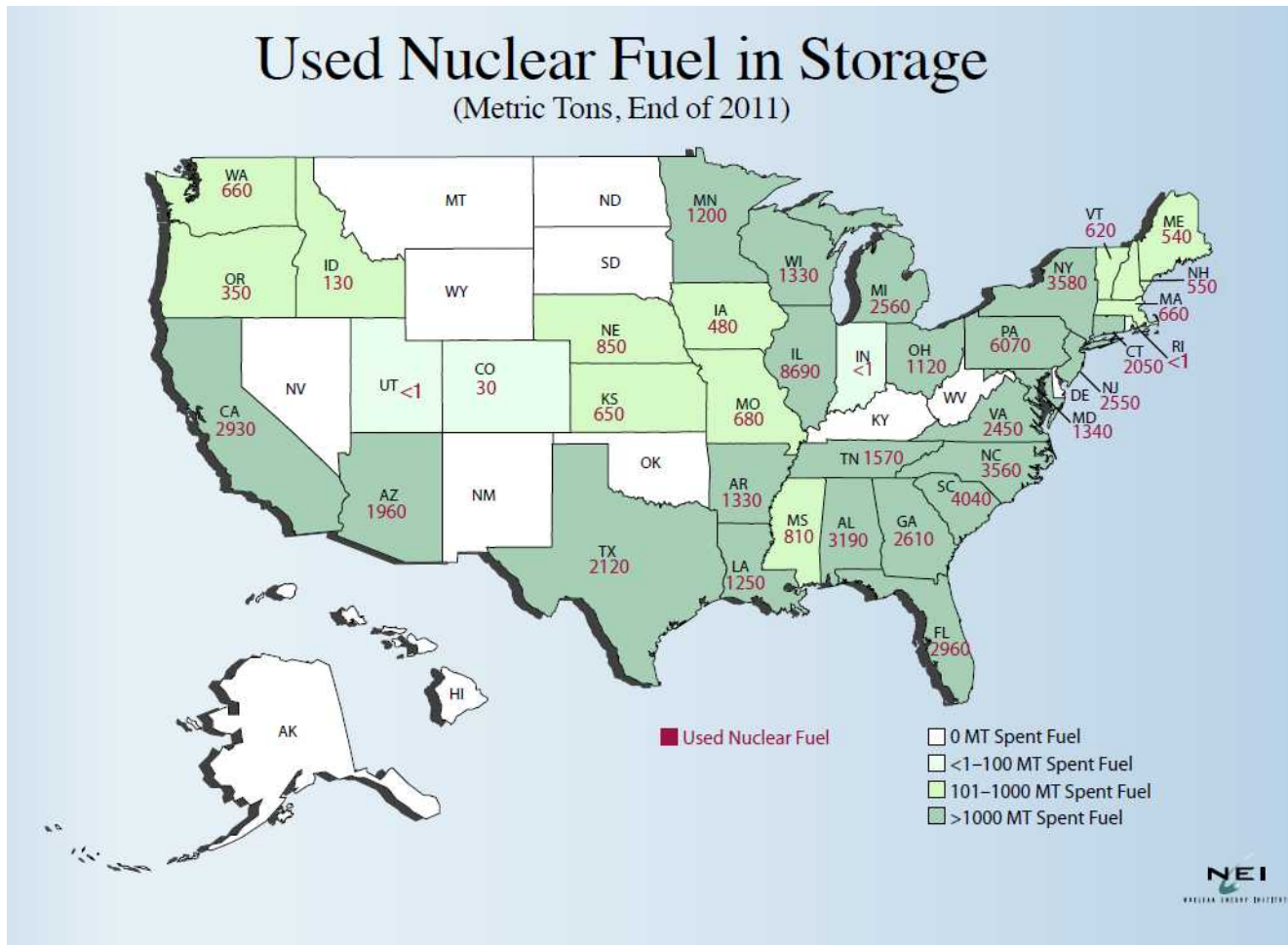
# Current Status of the Spent Nuclear Fuel Management Program in the United States

Robert J. MacKinnon  
Sandia National Laboratories  
February 5, 2013

# Outline

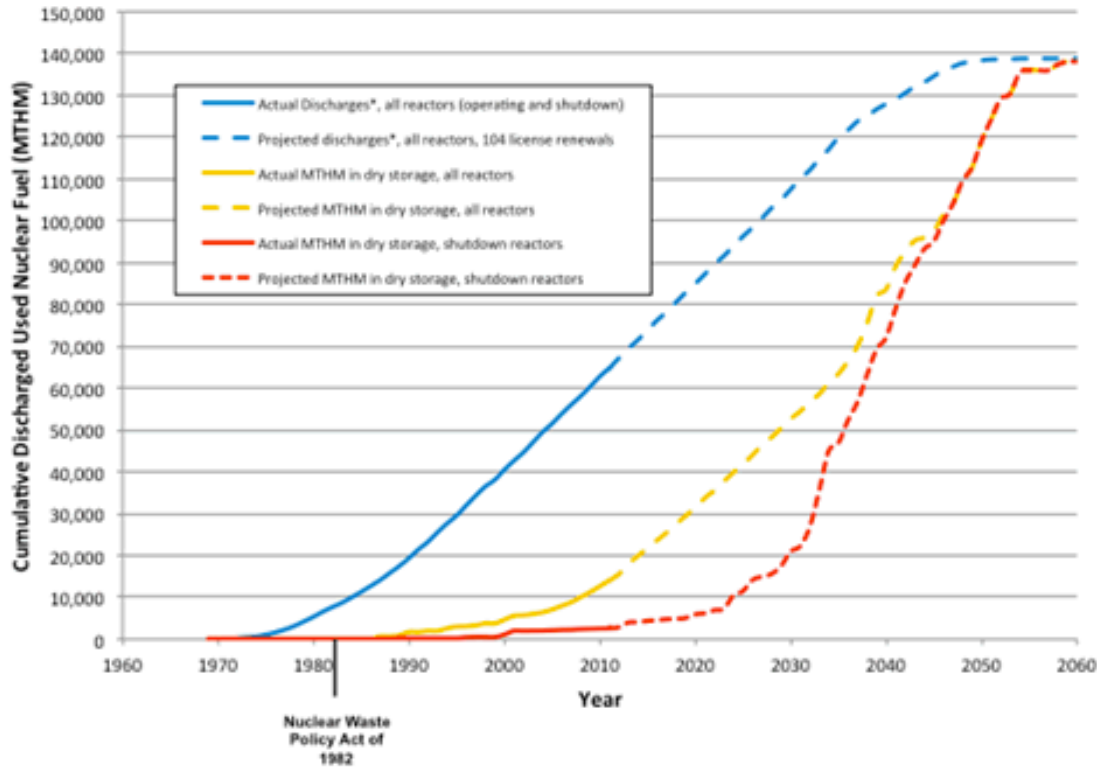
- Where spent nuclear fuel (SNF) and high-level radioactive waste (HLW) is stored today in the US
- Current status of the US Repository Program
  - Recommendations of the Blue Ribbon Commission
  - Constraints on the process
- The DOE's ongoing R&D program supporting Used Fuel Disposition

# Where Commercial Spent Nuclear Fuel is Today

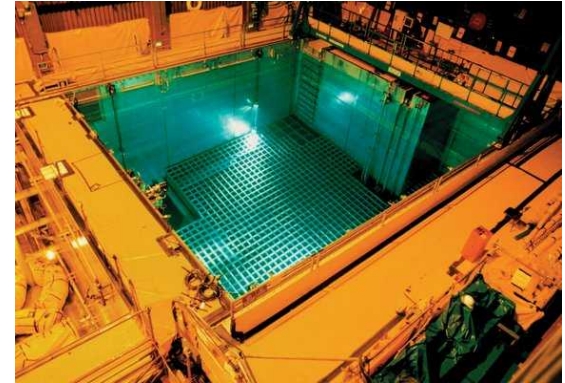


<http://nei.org/resourcesandstats/graphicsandcharts/usedfuel/>

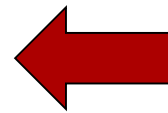
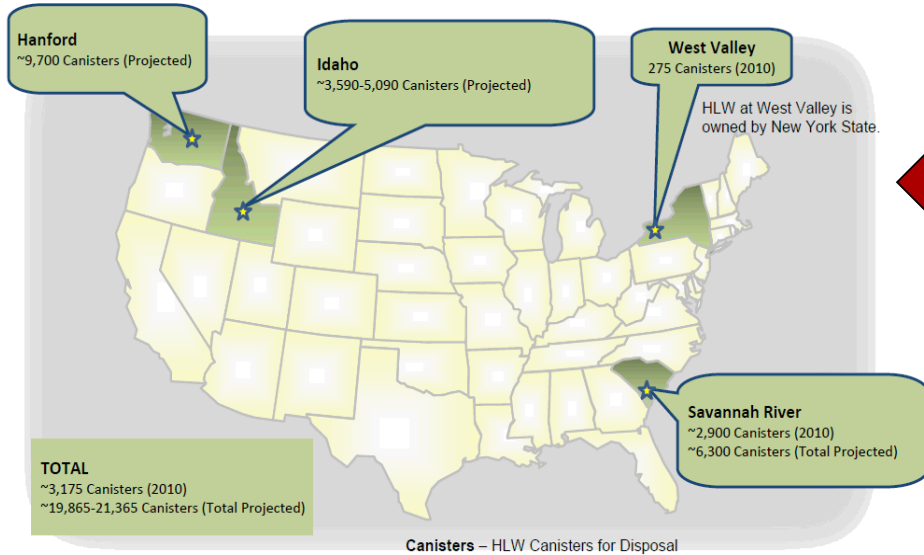
# Historical and Projected Commercial Spent Nuclear Fuel Discharges in the United States



Source: \*Based on actual discharge data as reported on RW-859s through 12/31/02, and projected discharges, in this case for 104 license renewals

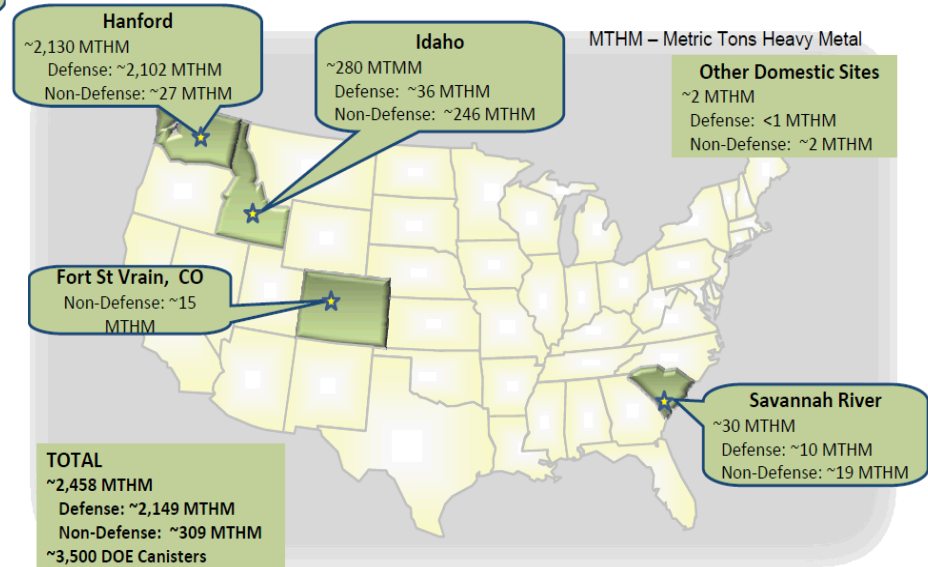
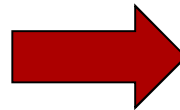


# Where DOE-Owned SNF and HLW is Today



DOE-Owned HLW  
~20,000 total canisters (projected)

DOE-Owned SNF  
~2,458 Metric Tons



# The U.S. Repository Program Today



- “Yucca Mountain is not a workable option” (DOE licensing motion, March 3, 2010)
  - “the Secretary’s judgment here is not that Yucca Mountain is unsafe or that there are flaws in the LA, but rather that it is not a workable option and that alternatives will better serve the public interest.” (DOE filing to NRC Licensing Board, May 27, 2010, footnote 102)
- The Nuclear Waste Policy Act remains in effect and Yucca Mountain remains the only legally available option
- Yucca Mountain license hearings remain suspended pending court action
  - August 3, 2012 ruling by the US Court of Appeals for the District of Columbia delays a decision until after December 14, 2012, pending Congressional action
- All current DOE activities related to disposal of spent nuclear fuel and high-level radioactive waste have moved to the DOE Office of Nuclear Energy and are limited to generic R&D
- The Waste Isolation Pilot Plant (WIPP) is in operation for transuranic waste, managed by the DOE Office of Environmental Management

# The Blue Ribbon Commission

## Recommendations from the BRC's Report to the Secretary of Energy, January 2012

- A new, consent-based approach to siting future nuclear waste management facilities
- Prompt efforts to develop one or more geologic disposal facilities
- Prompt efforts to develop one or more consolidated storage facilities
- Prompt efforts to prepare for the eventual large-scale transport of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities when such facilities become available
- Further RD&D to help resolve some of the current uncertainties about deep borehole disposal and to allow for a more comprehensive (and conclusive) evaluation of the potential practicality of licensing and deploying this approach
- The EPA and NRC should also develop a new regulatory framework and standards for deep borehole disposal facilities

# Administration response to the BRC recommendations

*STRATEGY FOR THE MANAGEMENT AND DISPOSAL OF USED NUCLEAR FUEL AND HIGH-LEVEL RADIOACTIVE WASTE*

*On page 13,  
Explicit recognition that deep borehole disposal development is on the R&D agenda*

“In FY 2013, the Department is undertaking disposal-related research and development work in the following areas: an evaluation of whether direct disposal of existing storage containers used at utility sites can be accomplished in various geologic media; an evaluation of various types and design features of back-filled engineered barriers systems and materials; evaluating geologic media for their impacts on waste isolation; evaluating thermal management options for various geologic media; establishing cooperative agreements with international programs; **and developing a research and development plan for deep borehole disposal, consistent with BRC recommendations.**”

# NWPA Constraints on Interim Storage Options

- Modifications to the NWPA are needed before DOE can operate a centralized storage facility
  - NWPA Section 145(b): “The Secretary may not select a site [for a monitored retrievable storage facility (MRS)] ... until the Secretary recommends to the President the approval of a site for development as a repository...”
  - NWPA Section 148(d)(1): “construction of such facility [MRS] may not begin until the Commission has issued a license for the construction of a repository ...”
  - NWPA Section 148(d)(3): the quantity of spent nuclear fuel or high-level radioactive waste at the site of such facility [MRS] at any one time may not exceed 10,000 metric tons of heavy metal until a repository under this Act first accepts ... waste”
- DOE is beginning planning now for implementation of centralized storage, pending Congressional authorization

# NWPA Constraints on Repository Siting Options

- Modifications to the NWPA are needed before DOE can investigate repository sites other than Yucca Mountain
  - NWPA Section 113(a): “The Secretary [of the DOE] shall carry out ... site characterization activities at the Yucca Mountain site.”
  - NWPA Section 114(b): “If the President recommends to the Congress the Yucca Mountain site ... and the site designation is permitted to take effect ... the Secretary shall submit to the Commission an application for a construction authorization ...”
  - NWPA Section 160(a)(2): “The Secretary shall terminate all site specific activities (other than reclamation activities) at all candidate sites, other than the Yucca Mountain site, within 90 days...”
  - NWPA Section 161(a): “The Secretary may not conduct site-specific activities with respect to a second repository unless Congress has specifically authorized and appropriated funds for such activities.”
- DOE is conducting research on generic disposal concepts

# DOE's R&D Focus for Storage and Transportation

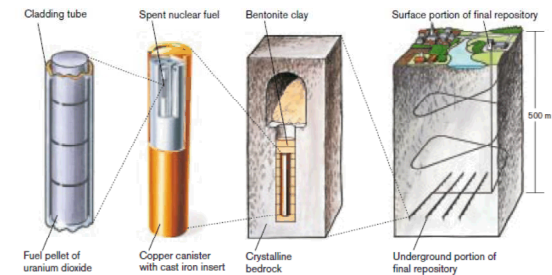
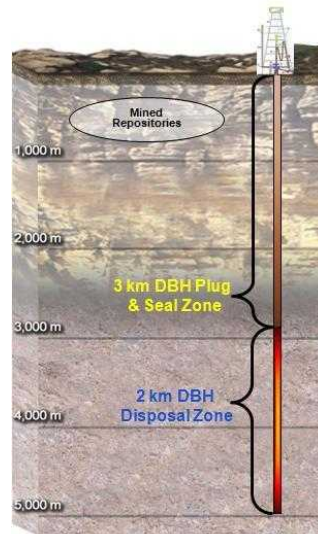
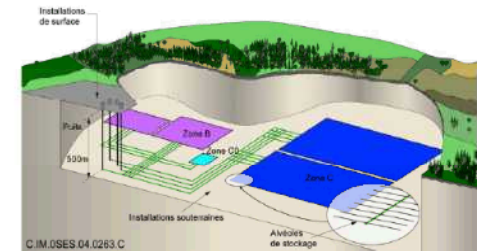
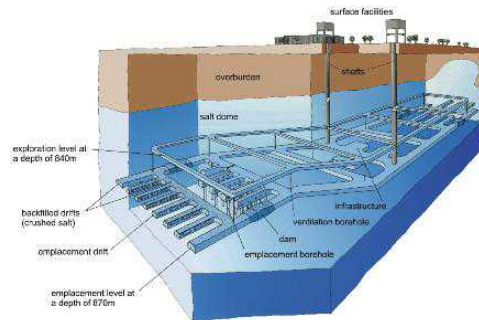
Prepare for extended storage and eventual large-scale transport of used nuclear fuel and high-level waste

- Develop the technical basis for
  - Extended storage of used nuclear fuel
  - Fuel retrievability and transportation after extended storage
  - Transportation of high-burnup used nuclear fuel



# DOE's R&D Focus for SNF and HLW Disposal

- Provide a sound technical basis for multiple viable disposal options in the US
- Increase confidence in the robustness of generic disposal concepts
- Develop the science and engineering tools needed to support disposal concept implementation



# Conclusions

- SNF and HLW are safely managed where they are today
  - Extended storage of SNF does not pose unprecedented technical challenges
    - *However, additional technical support may be needed for license extensions of existing storage facilities*
  - Legal, political, and social challenges to extended storage may be significant
- The US has multiple viable disposal options
  - There is extensive international experience
  - R&D on disposal concepts reinforces confidence that the technical basis will be ready when national policy is determined
- Legal and regulatory constraints are potentially significant regardless of the path chosen