SAND2015-10162PE

Used Fuel Disposition R&D Campaign

Background for the DOE's Decision to Explore Alternative Disposal Options for Some DOE-Managed High-Level Waste and Spent Nuclear Fuel

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Albuquerque, NM
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The March 24, 2015 Decision

The White House

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For Immediate Release March 24, 2015

Presidential Memorandum -- Disposal of Defense High-Level Radioactive Waste in a Separate Repository

MEMORANDUM FOR THE SECRETARY OF ENERGY

SUBJECT: Disposal of Defense High-Level Radioactive Waste in a Separate Repository

Your memorandum and accompanying report of January 9, 2015, analyze the factors enumerated in section 8 of the Nuclear Waste Policy Act of 1982 (the "Act") concerning disposal of high-level radioactive waste resulting from atomic energy defense activities, conclude that a strong basis exists to find a separate repository is required pursuant to section 8 of the Act, and recommend that I make this finding.

In accordance with the Act, I find the development of a repository for the disposal of high-level radioactive waste resulting from atomic energy defense activities only is required.

BARACK OBAMA

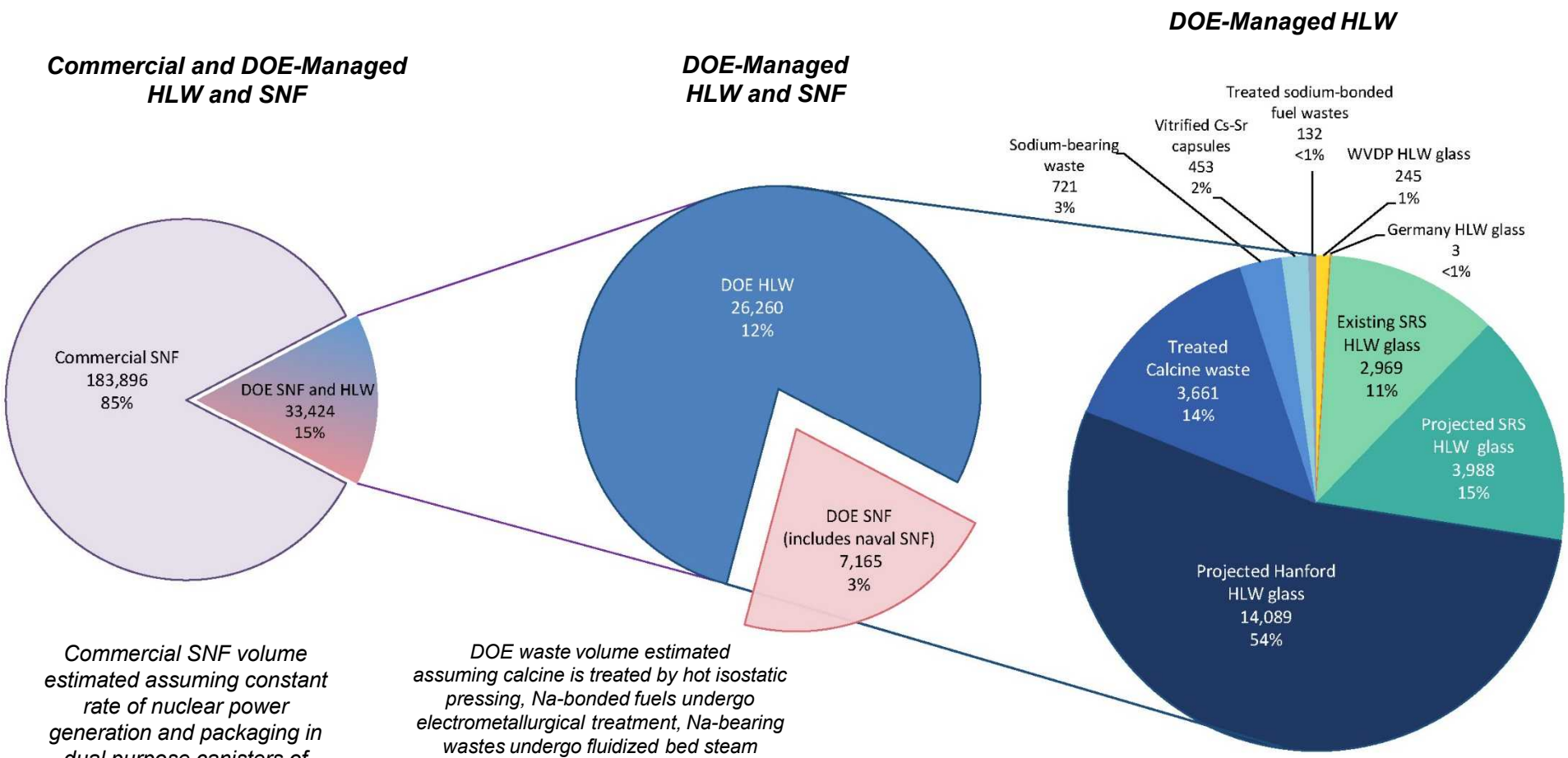
Underlying Documents

- **April 2014 UFD report "Evaluation of Options for Disposal…"**
  - Concludes that both commingled and separate repositories are technically feasible
- **October 2014 DOE report "Assessment of Disposal Options…"**
  - Recommends that the DOE begin implementation of a phased, adaptive, and consent-based strategy with development of a separate repository for some DOE-managed HLW and SNF
  - Also recommends the DOE retain flexibility to consider deep borehole disposal of some smaller DOE-managed waste forms
- **March 2015 DOE report "…Separate Disposal of Defense High-Level Radioactive Waste"**
  - Presents the basis for a decision in the context of the Nuclear Waste Policy Act

Used Fuel Disposition

Projected Volumes of HLW and SNF in 2048

Projected volumes in m^3



Commercial SNF volume estimated assuming constant rate of nuclear power generation and packaging in dual purpose canisters of existing design

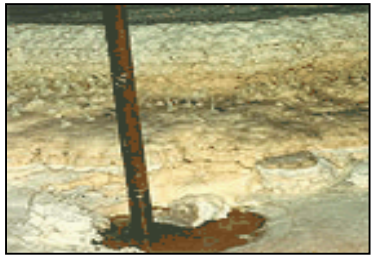
DOE waste volume estimated assuming calcine is treated by hot isostatic pressing, Na-bonded fuels undergo electrometallurgical treatment, Na-bearing wastes undergo fluidized bed steam reforming, and all other HLW wastes are vitrified. Naval SNF estimated as of 2035

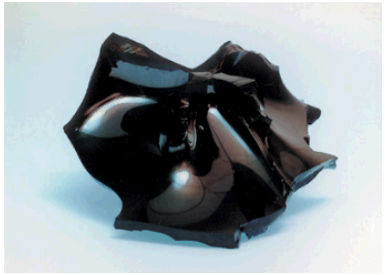
From a presentation by John W. Herczeg to the 2015 Annual Meeting of the National Council on Radiation Protection and Measurements, March 16, 2015

Physical Characteristics of Waste Can be a Factor When Considering Disposal Options

- **Commercial SNF**
  - Essentially all U0x fuel of various types
  - Presently being loaded in large dual-purpose dry storage canisters; *significant thermal management issues*
  - Most repository concepts call for repackaging

- **DOE-managed HLW**
  - Vitrified wastes at Savannah River Site, projected at Hanford and Idaho sites
  - Projected other engineered forms
    - *e.g., electrometallurgical treatment wastes, solids created by hot isostatic pressing of granular calcine at Idaho site*
  - Salts, granular solids, and powders
- **DOE-managed SNF**
  - Metallic and non-oxide SNF
  - Sodium-bonded SNF
  - U and Pu oxide SNF
  - Coated particle SNF
  - Naval SNF





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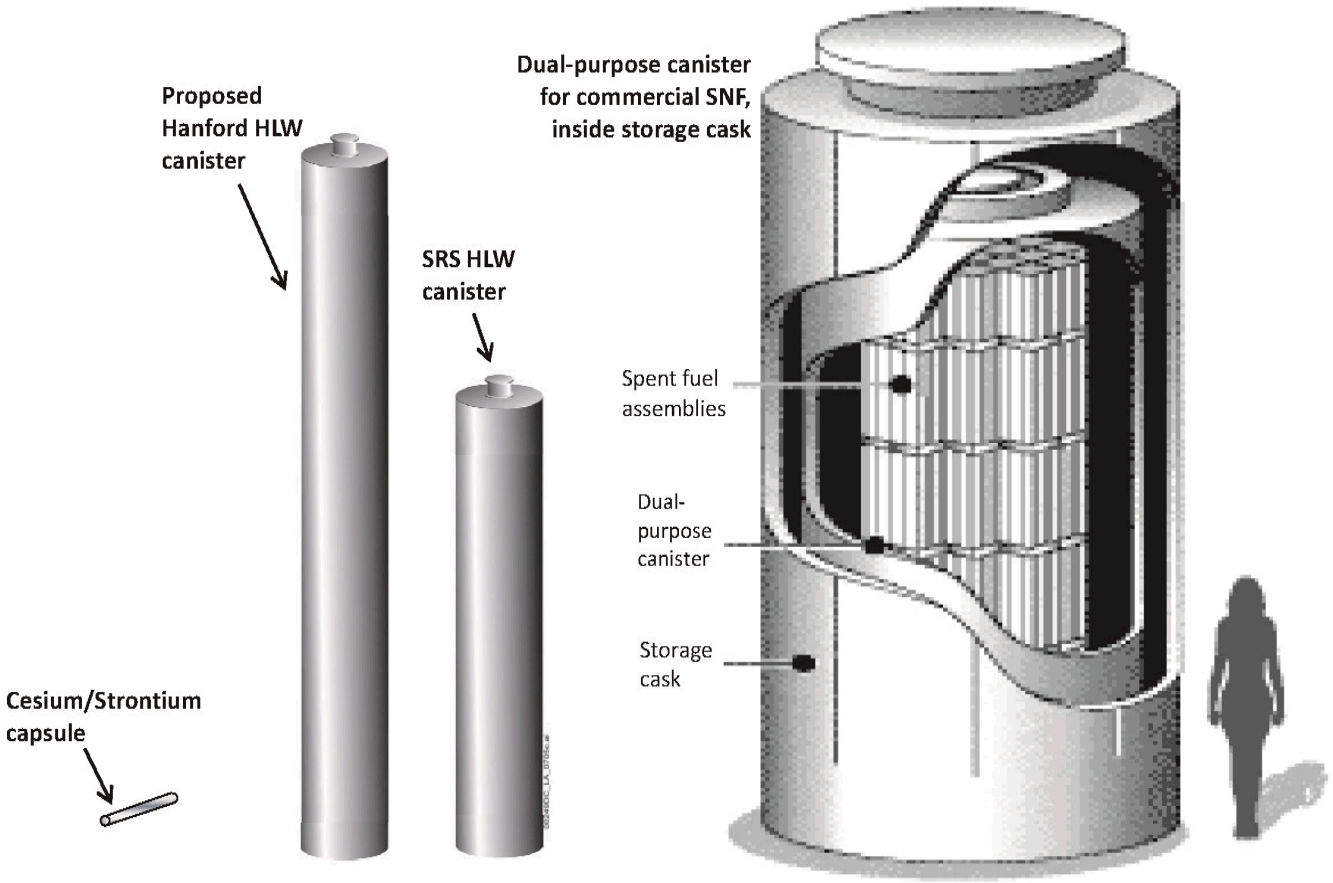
Relative Size of Waste Packaging May Have an Impact on Disposal Options

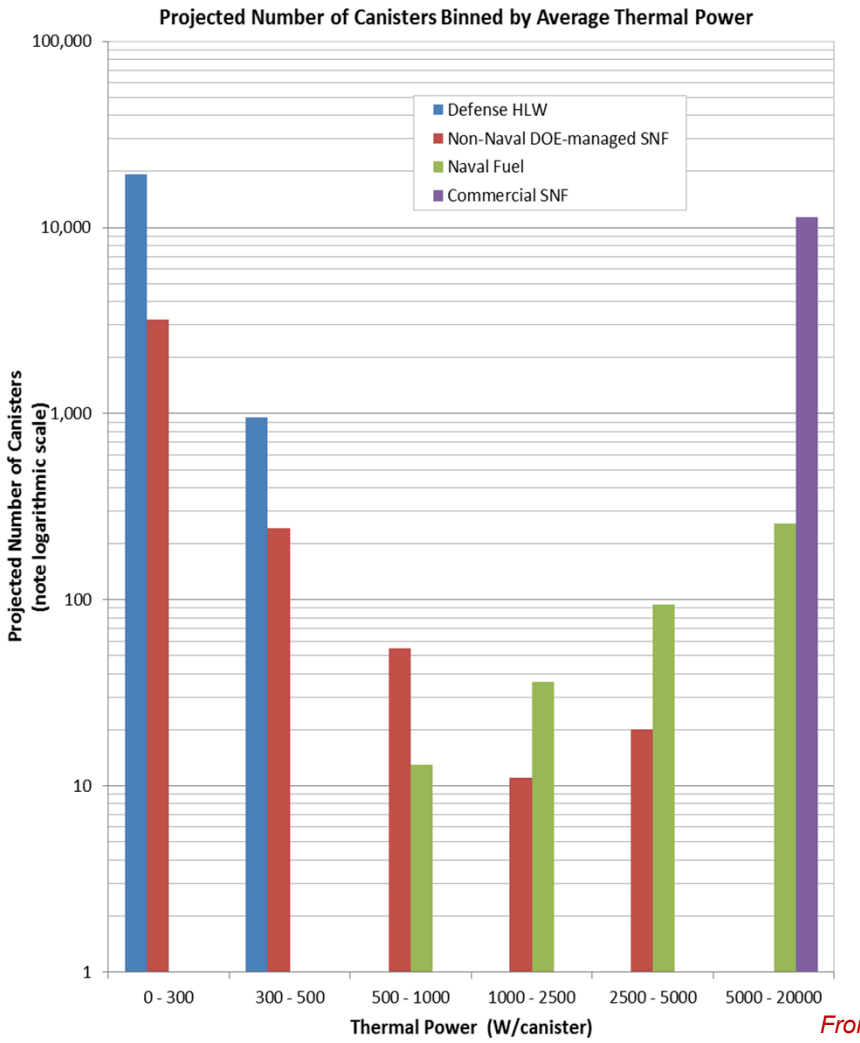


Approximate Scale

The smallest forms of HLW and SNF that can fit into small diameter canisters could be candidates for deep borehole disposal

From a presentation by John W. Herczeg to the 2015 Annual Meeting of the National Council on Radiation Protection and Measurements, March 16, 2015

Thermal Characteristics of HLW and SNF Affect Disposal Strategies

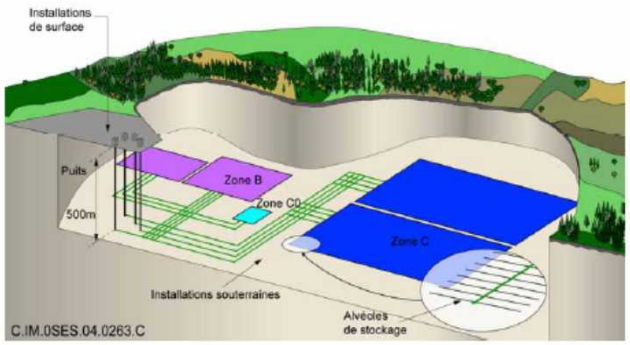


- All defense HLW is relatively cold: less than 500 W per canister
- Most DOE-managed SNF is relatively cold: less than 1000 W per canister
- All commercial SNF has comparatively high thermal output
- Some naval SNF is comparable in thermal power to commercial SNF
- Repository designs and operational concepts can be engineered to address waste form thermal characteristics

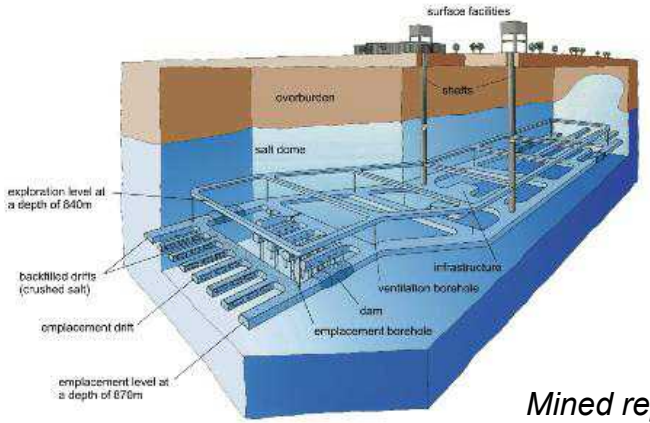
From a presentation by John W. Herczeg to the 2015 Annual Meeting of the National Council on Radiation Protection and Measurements, March 16, 2015

Used Fuel Disposition

Disposal Concepts

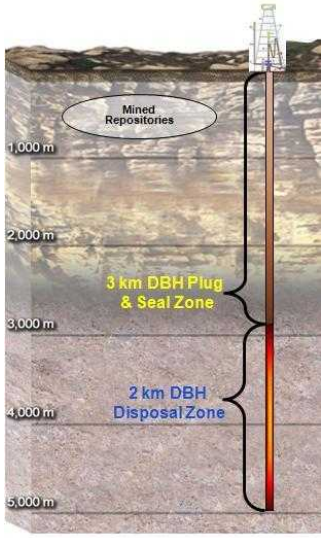


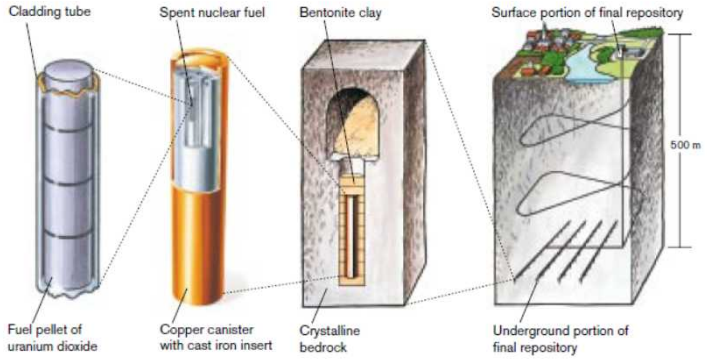
Mined repositories in clay/shale



Mined repositories in salt

Deep boreholes in crystalline rock





Mined repositories in crystalline rock

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The FY16 Budget Request and DOE Guidance

From Volume 3 of the 2016 DOE Budget Request, page 439:

> "In FY 2016, the Department requests $3.0 million for a new UNFD subprogram element: DOE-Managed High-Level Radioactive Waste (HLW) and Spent Nuclear Fuel (SNF). This new subprogram element will include activities associated with exploring potential alternative disposal options for some DOE-managed HLW and SNF."

FY15 start on some activities:
$250k of new funding approved June 10, 2015 (BCP-FT-2015-32)

FY16 work scope approved, but appropriation still uncertain