

# Used Fuel Disposition Campaign

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## DOE Managed Spent Nuclear Fuel (SNF) and High Level Waste (HLW) Repository – *Inventory Overview*

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## ■ DOE-Managed SNF and HLW Repository (DREP) Background

- Document Bases
- Disposal Concepts Focus for FY16
- Inventory Activities Introduction

## ■ Status of DREP Inventory Activities

# Used Fuel Disposition

# Underlying Documents

## ■ April 2014 UFD report “Evaluation of Options for Disposal...”

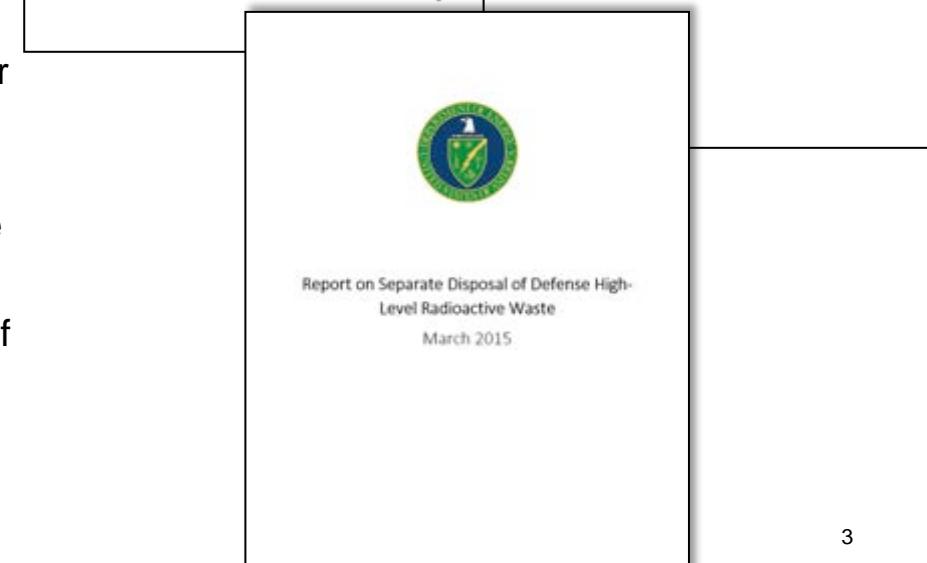
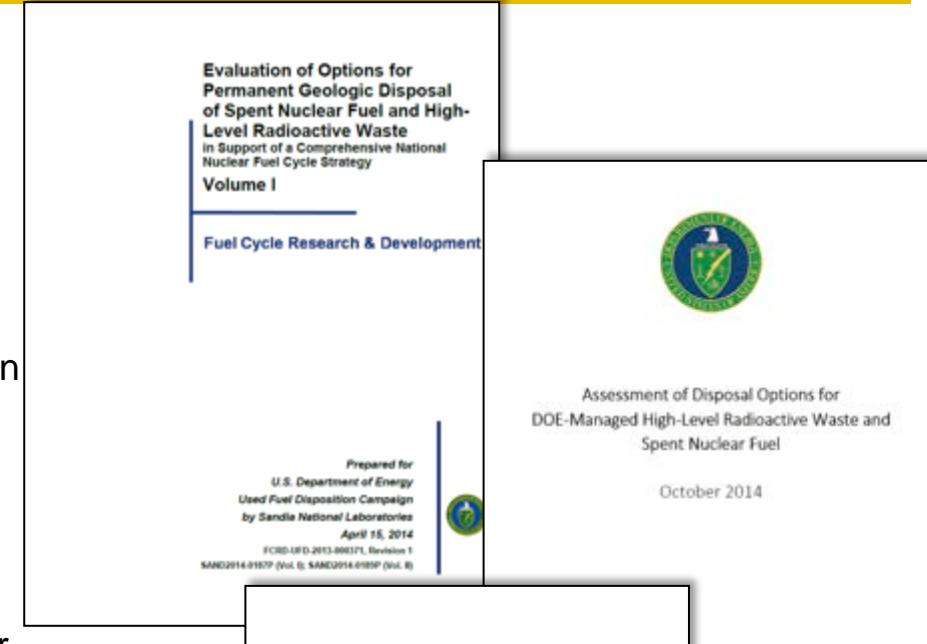
- Concludes that both commingled and separate repositories are technically feasible

## ■ 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

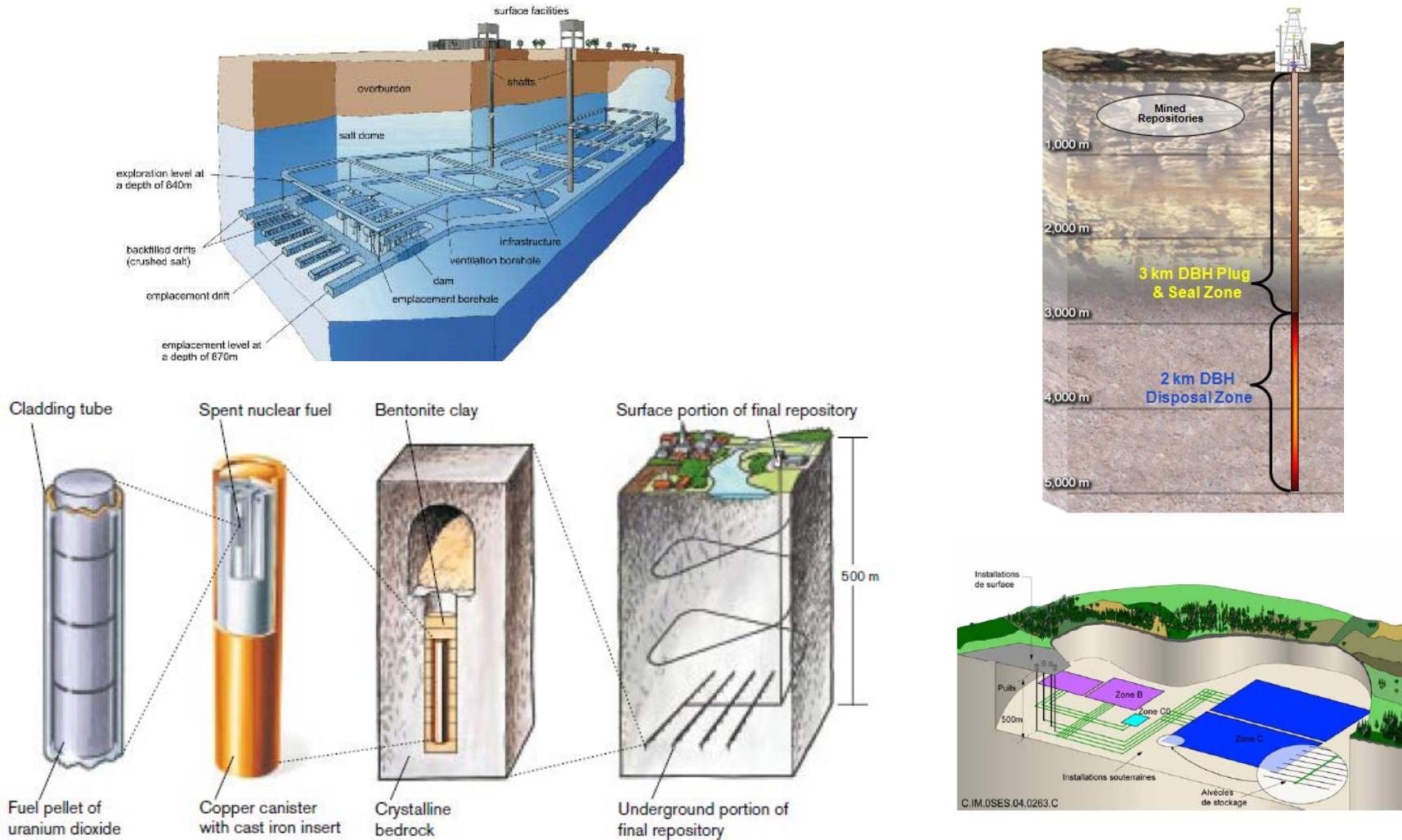
## ■ March 2015 DOE report “...Separate Disposal of Defense High-Level Radioactive Waste”

- Presents the basis for a decision in the context of the Nuclear Waste Policy Act

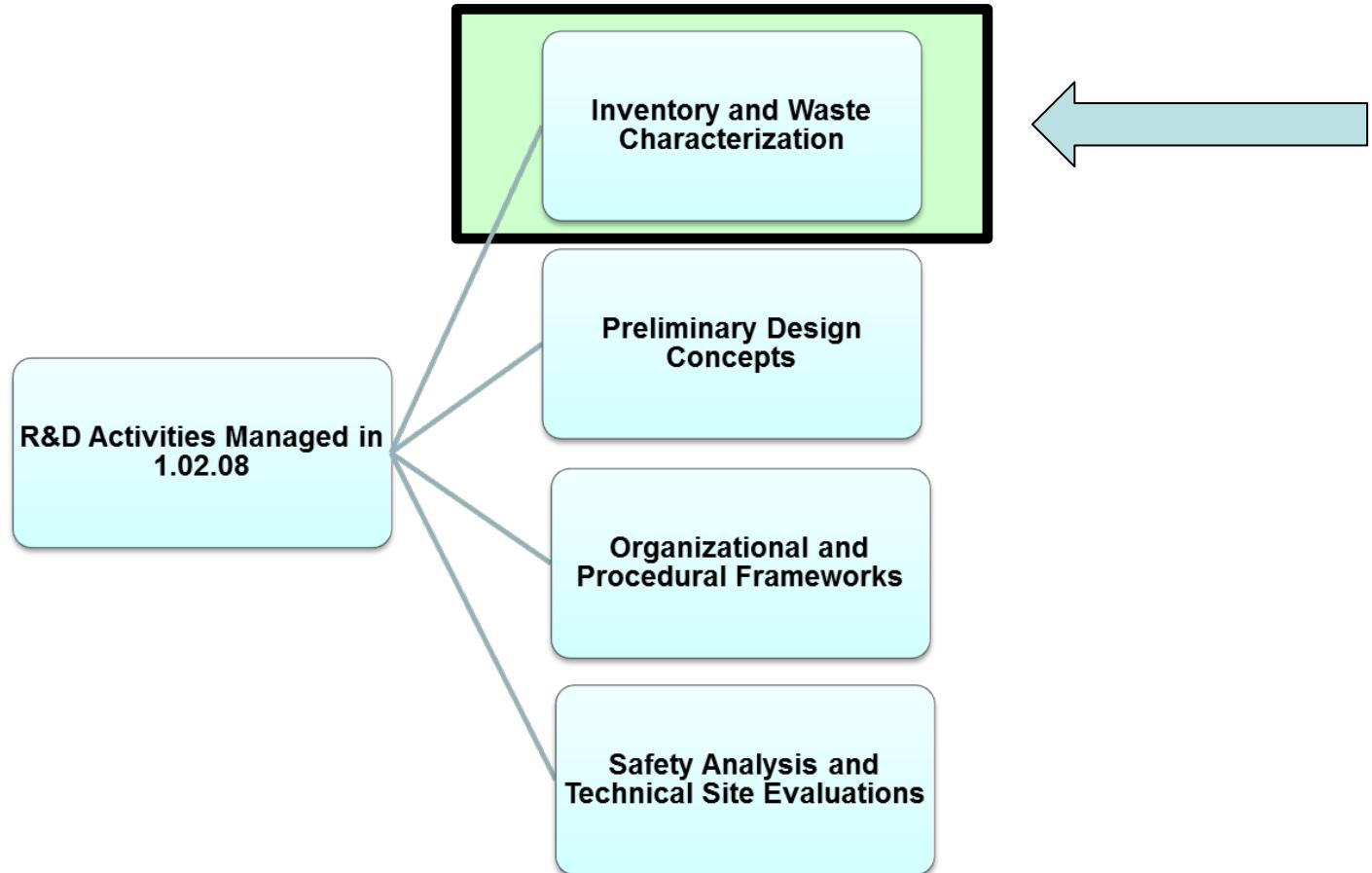


# Used Fuel Disposition

## Disposal Concepts Focus



# DREP Technical Work Areas



**OBJECTIVE:**

Delineate the inventories of waste forms for disposal and their expected behavior in various disposal concepts.

**SCOPE:**

- Organize and coordinate information on both waste forms to be disposed and repository concepts for disposal to inform safety assessments (WP1)
- Develop a listing and inventory of DOE-managed HLW and SNF radioactive wastes which were assessed in the disposal options evaluation work and identify any additional waste forms to be added (WP2)
- The on-line waste library (OWL) will be constructed for information on DOE-managed HLW, SNF, and other wastes that are potential candidates for deep geologic disposal, with links to supporting documents (WP3)
- Characterize long-term performance of alternative waste forms (WP4)

## ■ Three Levels of Inventory Information Discretization

- **Detailed Level** – includes all the details of existing HLW and DSNF
  - *HLW Inventory from Disposal Options Report (SNL, 2014)*
  - *Consistent with DOE SNF database (34 DOE SNF primary types - INL)*
    - Additional developed data needed for GDSA usage (future)
  - *Loaded into the **Online Waste Library (OWL)** (in development)* – *will contain*
    - Existing SNF and HLW wastes
      - *Current planned waste form*
      - *Alternative waste form(s)*
    - Potential disposal packaging alternatives (future)
- **Intermediate Level** – groupings of waste forms (SNL, 2014)
  - *Based primarily on*
    - Expected post-closure degradation behavior
    - Major physical and chemical characteristics
  - *7 groups for consideration in engineering/design evaluations*
- **GDSA Level** – grouping solely on degradation behavior (3 groups=>more in future)
  - *Glass degradation rate*
  - *UO<sub>2</sub> degradation rate*
  - *Instantaneous degradation rate*

Waste group	Description
WG1	All commercial SNF packaged in purpose-built disposal containers
WG2	All commercial SNF packaged in dual-purpose canisters of existing design
WG3	<b>All vitrified HLW (all types of HLW glass, existing and projected, canistered)</b>
WG4	<b>Other engineered waste forms</b>
WG5	<b>Metallic and non-oxide DOE spent fuels</b>
WG6	<b>Sodium-bonded fuels (driver and blanket), direct disposed<sup>1</sup></b>
WG7	<b>DOE oxide fuels</b>
WG8	<b>Salt, granular solids, and powders</b>
WG9	<b>Coated-particle spent fuel</b>
WG10	<b>Naval fuel</b>

**Table ES-2. Waste group descriptions**

Note: it was concluded that insufficient data exist to evaluate direct disposal of sodium-bonded fuels [from SNL, 2014]. This material would be processed (via EM refining) into a salt waste (to be made into a glass ceramic) and a metallic waste (to be disposed as ingots)..

## ■ Inventory Integration

- Initial Considerations of **Thermal** Variability (Carter et al., 2014)
  - SRNL glass waste (*Table 3-1*)
  - Hanford glass (*Table 3-2*)
  - Hanford Cs/Sr capsules (*Vitrified – Table 3-2*)
  - Idaho Calcine (*HIP into 2ft X 10ft glass canisters - Table 3-2*)
  - DOE SNF (*various – Table 3-4*)
- SAR inventory comparisons

## ■ Waste Form Performance Evaluations

- DOE SNF (34 types) Grouped for SAR Postclosure PA Evaluations as
  - *UO<sub>2</sub> degradation rate (Naval Spent Fuel)*
  - *Instantaneous degradation rate (10 other groups)*
  - *Evaluate prior PA groupings with other performance bases (e.g., particles)*
- Calcine waste
  - *HIP'd = glass waste form degradation – evaluate bases*

## ■ **OWL** – Prototype Development and Demonstration

# Backup Slides

# Used Fuel Disposition

# Inventory and Waste Characterization: Complete & Populate Online Waste Library (OWL)

## SCOPE:

The on-line waste library (OWL) will be implemented to contain detailed cross-linked information, both technical and organizational, regarding DOE-managed high-level waste (HLW) and spent nuclear fuel (SNF) (D-wastes), and other DOE-managed radioactive wastes that are likely candidates for deep geologic disposal, with links to the current supporting documents for the data (where possible).

## OBJECTIVES:

- Finalize the initial design of the information system that implements the database
- Implement the database onto a platform with account access available to a prototype group (i.e., DOE and National Laboratory participants)
- Populate the database with at least a portion of the primary technical data for the waste types/forms.

