

Used Fuel Disposition Campaign

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

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Used Fuel Disposition Campaign Annual Working Group Meeting

June 6-9, 2016

Presentation Overview

- **DOE-Managed SNF and HLW Repository (DREP) Background**
 - Document Bases
 - Disposal Concepts Focus for FY16
 - Inventory Activities Introduction
- **Status of DREP Inventory Activities**

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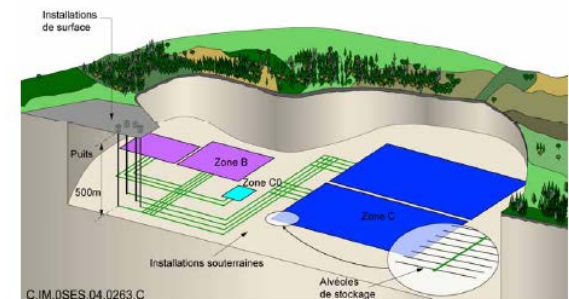
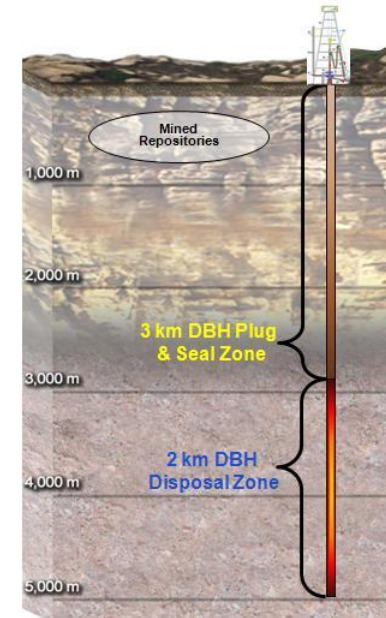
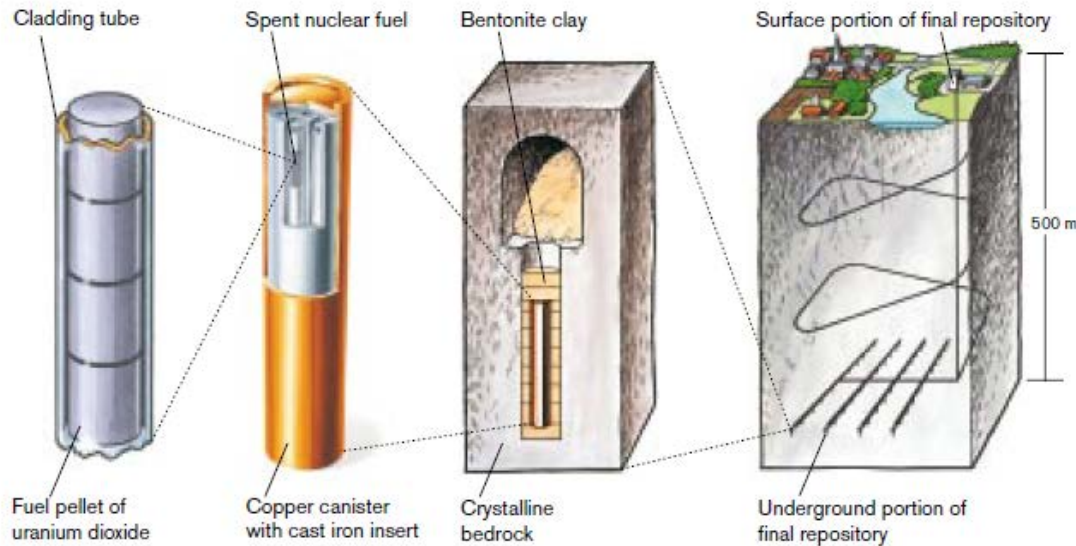
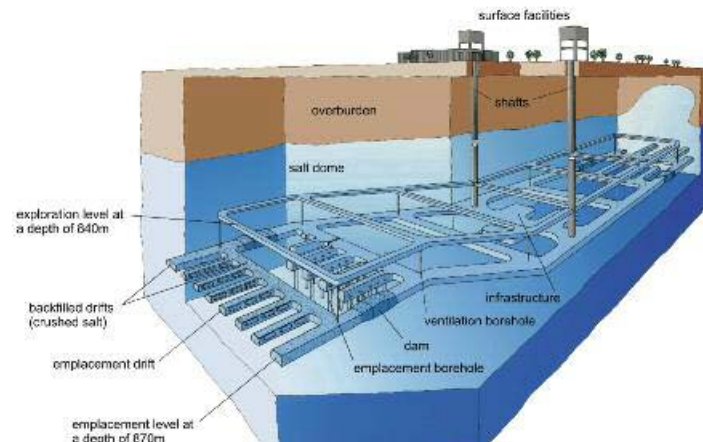
Underlying Documents

- **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

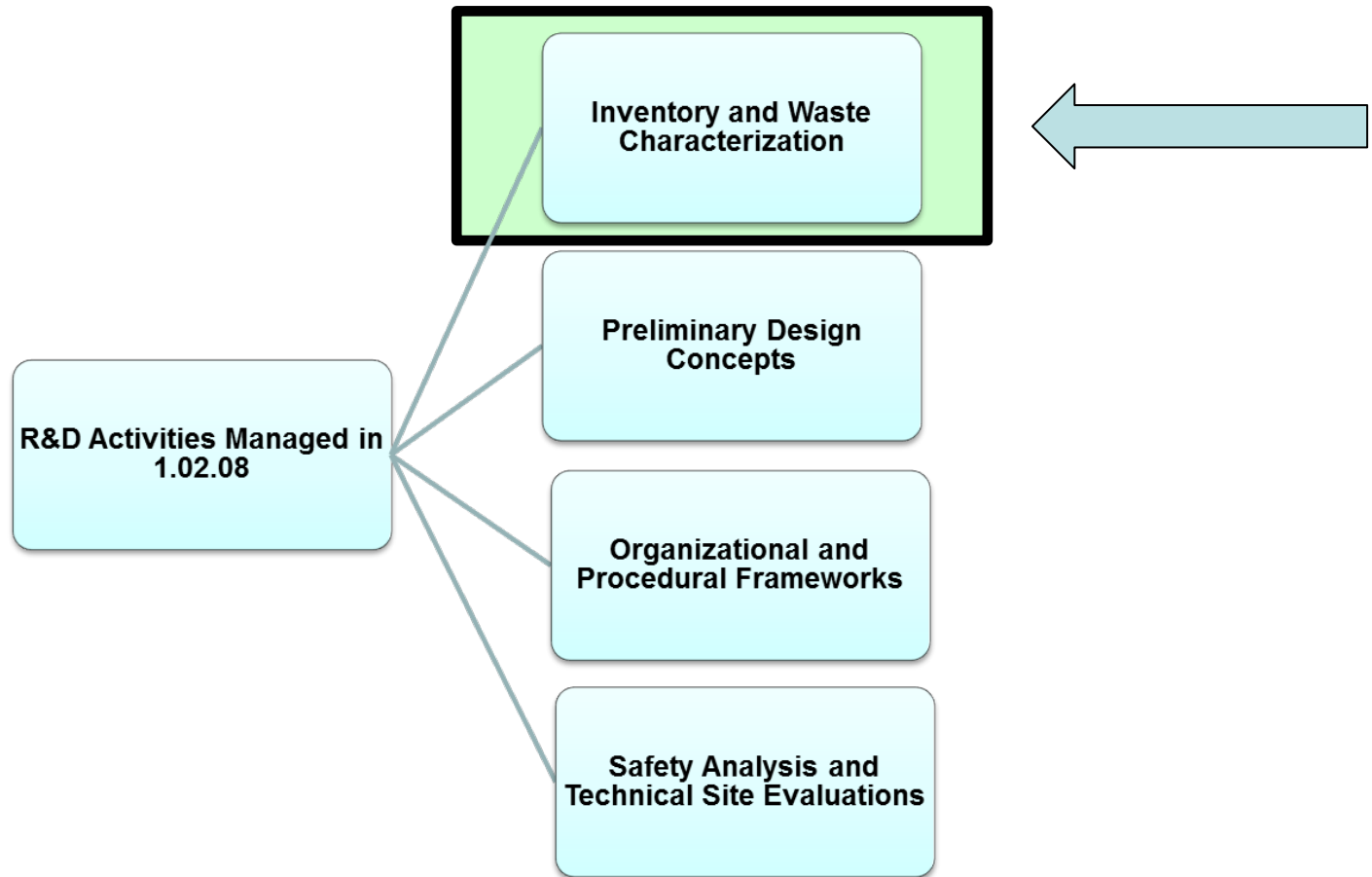


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Disposal Concepts Focus



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*
 - *UO₂ degradation rate*
 - *Instantaneous degradation rate*

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Inventory Intermediate Level Summary: Waste Form Groups

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	All vitrified HLW (all types of HLW glass, existing and projected, canistered)
WG4	Other engineered waste forms
WG5	Metallic and non-oxide DOE spent fuels
WG6	Sodium-bonded fuels (driver and blanket), direct disposed ¹
WG7	DOE oxide fuels
WG8	Salt, granular solids, and powders
WG9	Coated-particle spent fuel
WG10	Naval fuel

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
 - *UO₂ 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

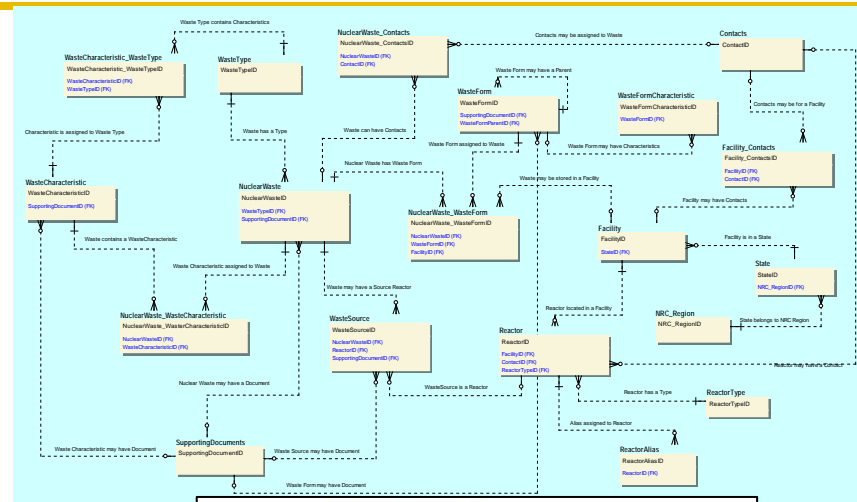
Backup Slides

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.



Waste Detail									
Waste Name	Waste Characteristic	Waste Type	Waste Form	Facility	Reactor	Reactor Type	State	NRC Region	Supporting Documents
Elk River and Blaine River	High-level waste	High-level waste	High-level waste	Elk River and Blaine River	Elk River and Blaine River	Elk River and Blaine River	Elk River and Blaine River	Elk River and Blaine River	Elk River and Blaine River
Waste Sources									
SNF	High-level waste	High-level waste	High-level waste	High-level waste	High-level waste	High-level waste	High-level waste	High-level waste	High-level waste
Waste Characteristics									
Waste Name	Waste Characteristic	Waste Type	Waste Form	Facility	Reactor	Reactor Type	State	NRC Region	Supporting Documents
Elk River and Blaine River	High-level waste	High-level waste	High-level waste	Elk River and Blaine River	Elk River and Blaine River	Elk River and Blaine River	Elk River and Blaine River	Elk River and Blaine River	Elk River and Blaine River
Waste Forms									
Waste Name	Waste Characteristic	Waste Type	Waste Form	Facility	Reactor	Reactor Type	State	NRC Region	Supporting Documents
Elk River and Blaine River	High-level waste	High-level waste	High-level waste	Elk River and Blaine River	Elk River and Blaine River	Elk River and Blaine River	Elk River and Blaine River	Elk River and Blaine River	Elk River and Blaine River