SAND2016-2953PE

Used Fuel Disposition R&D Campaign

Inventory Overview

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Used Fuel Disposition R&D Campaign

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DOE Managed HLW and SNF Research: Inventory Overview

- **Three Levels of Inventory Information**
  - 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 GDSA needed developed data (future)**
    - *Loaded into the Online Waste Library (OWL) (in development) – will contain*
      - **Current planned waste form**
      - **Alternative waste form(s)**
      - **Potential disposal packaging**
  - Intermediate Level – groupings of waste forms
    - *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*
      - **Glass degradation rate**
      - **UO_2 degradation rate**
      - **Instantaneous degradation rate**

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

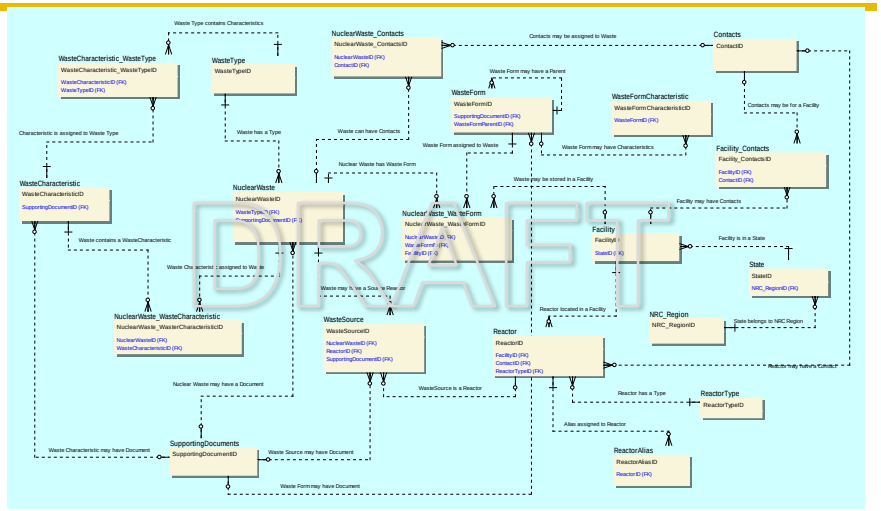
Note: it was concluded that insufficient data exist to evaluate direct disposal of sodium-bonded fuels [from SNL, 2014]. This material would be processed (via EM refining) into a salt waste (to be made into a glass ceramic) and a metallic waste (to be disposed as ingots)..

Inventory for FY16 Work and Thermal Considerations

- **Using Carter et al., 2014 for Initial Considerations of Thermal Variability**
  - SRNL glass waste (Table 3-1)
    - *5 thermal bins (100% < 500 W)*
  - Hanford glass (Table 3-2)
    - *4 thermal bins (100% < 300 W)*
  - Hanford Cs/Sr capsules (Vitrified – Table 3-2)
    - *1 thermal bin (300-500 W; year 2043 decayed)*
  - Idaho Calcine (HIP into 2ft X 10 ft glass canisters - Table 3-2)
    - *1 thermal bin (100% < 50 W)*
  - DOE SNF (various – Table 3-4)
    - *No Na-bonded fuel, SRNL SRE fuel, no Navy fuel*
    - *9 thermal bins (99% < 1000 W)*
- **DOE SNF (34 types) Grouped for SAR Postclosure PA Evaluations as**
  - 11 groups
    - *1 for Navy fuel – bounded by UO_2 degradation rate*
    - *10 other groups – bounded by* Instantaneous *degradation rate*
      - **Primarily N-reactor metallic fuel**

BACKUP MATERIALS

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 **organizationa**l, 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.