

Used Fuel Disposition R&D Campaign

Inventory and Waste Form Characterization

David Sassani
Work Package Manager
Used Fuel Disposition R&D Campaign

Albuquerque, NM
November 19, 2015

OBJECTIVES:

Work activities in this control account address the technical elements necessary to 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 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)

LEVEL 2 MILESTONE:

The On-line Waste Library (OWL): Usage and Status Report (SNL, 9/23/2016)

SCOPE:

- Assessing a waste repository for DOE managed high level waste (HLW) and spent nuclear fuel (SNF) (D-wastes) entails information regarding both the waste forms to be disposed therein and the repository concept in which disposal would be implemented. Both of these aspects will be organized and coordinated in this planning package.

OBJECTIVES:

Update the cross-walk of information needs for D-wastes and potential repository concepts (and design aspects) so that safety assessments of such a disposal option would consider a comprehensive set of possible combinations. Identify the information/features of various repository concepts which may be different for a D-waste repository vs the same concept that would include CSNF as well.

Product – Summary white paper on design changes for each of 3 repository concepts that would need revised FEPs Screening analyses for input to M2 (level 2 milestone) in OWL work package later in summer.

INFORMATION ORGANIZATION TEAM:

E. Stein (Lead), P. Mariner, and D. Sassani

[with support from members of Inventory Update Team and Waste Form Performance Team. Integrate with E. Matteo, D. Sevougian, and G. Appel, as well as C. Jove-Colon (argillite), Y. Wang (granite/crystalline) and C. Leigh (salt) leading the generic repository concepts reference cases.]

SCOPE:

- Identifying, listing, and developing inventories for DOE managed high level waste (HLW) and spent nuclear fuel (SNF) (D-wastes) which were assessed in the disposal options evaluation work (SNL 2014), as well as for any additional D-wastes identified since that previous study.
 - Note that the data in Appendix C, Table C-1 of SNL (2104) represent about 90-95% of the waste types expected to be included (in exclusion of the commercial SNF in that table).
 - Waste types that do not exist and are not within the identified accepted disposition pathway will not be included in the disposal inventory, however alternate waste forms for waste types that exist, or are defined to exist, would be included.

OBJECTIVES:

Delineate the full set of D-wastes to be considered for a DOE-managed (AEA) radioactive waste repository identifying those with inventory data included in the disposal options evaluation (SNL 2014) and those for which inventory data must be collected and compiled. Continue compiling the inventory data for those D-wastes that are beyond the information in the disposal options evaluation.

Product—a white paper with associated tabulation of the wastes for inclusion in the D-repository inventory, identifying those with inventory data in SNL (2014) and those data gaps that are to be filled, for input to M2 (level 2 milestone) in OWL work package later in summer.

INVENTORIES UPDATE TEAM:

R. Rogers (Lead), J. Prouty, and D. Sassani

[with support from J. Carter (SRNL Work Package) and others from the WF Performance Team. Integrate with E. Matteo, D. Sevougian, and G. Appel, as well as staff in the Information Organization Team]

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), and populate the database with at least a portion of the primary technical data for the waste types/forms.

Products – Three intermediate products (a) Design document for OWL; (b) Methodology to populate OWL; and (c) Visualization Tools for OWL will be generated as OWL is implemented and populated. A working prototype OWL with a subset of the data to be populated will be functional by end of FY16.

M2 - The On-line Waste Library (OWL): Usage and Status Report (SNL, 9/23/2016)

OWL IMPLEMENTATION TEAM:

R. Rechard (Lead), W. Walkow, L. Price, D. Betsill, and D. Sassani
[with support from members of Inventory Update Team and Waste Form Performance Team. Integrate with E. Matteo, D. Sevoujian, and G. Appel. Cross integration with UFDC NFST database staff for the CSNF database at ORNL and with DOE EM database staff for the DSNF database at INL.]

SCOPE:

- Characterization of the long-term performance of alternative waste forms (WF) that are likely candidates for deep geologic disposal in a repository for DOE-managed high-level waste (HLW) and spent nuclear fuel (SNF) (D-Wastes). Such information on expected WF degradation rates would be used to constrain in part the source-term of the various waste forms in safety assessments of a D-repository.

OBJECTIVES:

Develop a set of constraints (and/or a list of existing gaps in the constraints) for expected degradation behavior for the suite of waste forms identified for deep geologic disposal in a repository for D-wastes. This work would begin with a literature survey, including the YM SAR, to identify existing data/models to define these constraints, including rationale for bounding degradation rate behavior. Identification of gaps in the constraints will be used to elucidate a further approach to collect missing data.

Product – Summary white paper on compiled constraints and gaps in those for the identified waste forms in the D-wastes inventories for input to M2 (level 2 milestone) in OWL work package later in summer.

WF PERFORMANCE TEAM:

M. Rigali (Lead), J.H. Jang, E. Stein, P. Weck, E. Lindgren, and D. Sassani
[with support from members of Inventory Update Team and Information Organization Team. Integrate with the OWL Implementation Team, E. Matteo, D. Sevougian, and G. Appel, as well as C. Jove-Colon (argillite), Y. Wang (granite/crystalline) and C. Leigh (salt) leading the generic repository concepts reference cases.]

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]