SAND2016-2916PE

Used Fuel Disposition R&D Campaign

Work Package Integration: DOE-Managed HLW and SNF Research

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UFD R&D D-Repo Integration Meeting
Albuquerque, NM
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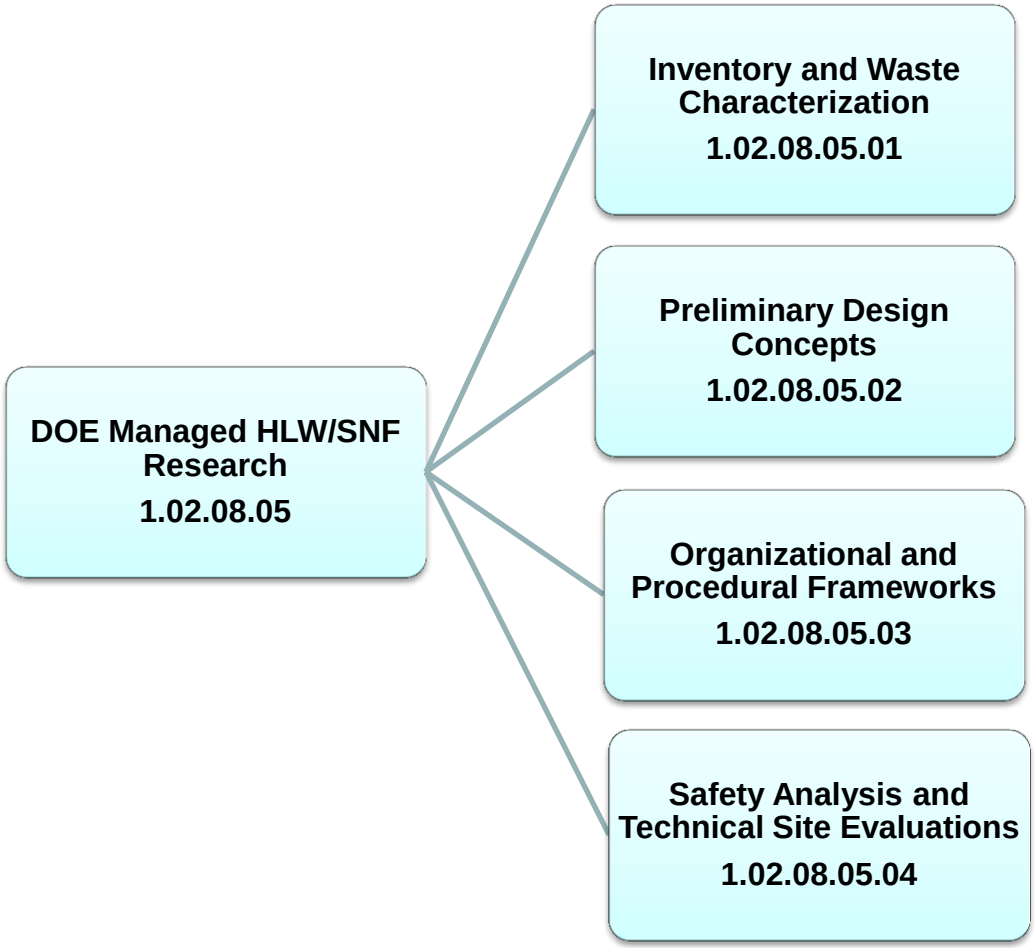
Meeting Objectives

- **Review and status workscope subsequent to the D-Repo funding cut, including (but not limited to) the following items:**
  - Inventory/thermal bins from Joe Carter, if available
  - Status of design concepts being considered by both PA and EBS
  - Status/plan on thermal analyses
  - Integration of SNL/LANL regarding granite geology/properties
  - Planning for UFD June Working Group Meeting

Major D-Repo WBS Elements



Used Fuel Disposition

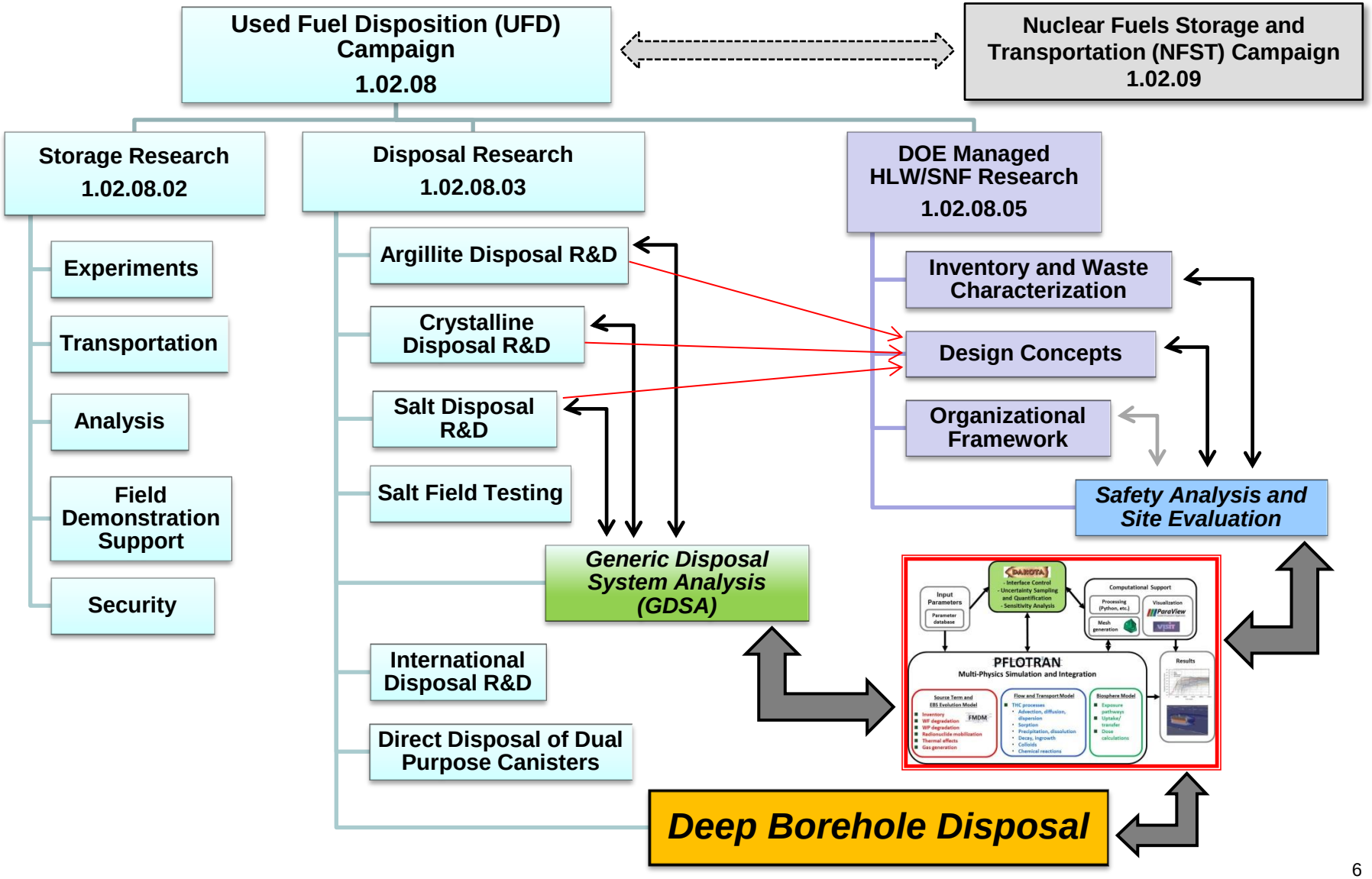
D-Repo Work Packages and Funding

WBS	Work Package Title	Work Package ID	Current FY Funding	Prior Year Carryover	Total Available
1.02.08.05.01	**Inventory and Waste Characterization**				
1.02.08.05.01	Organize repository design assessment information - SNL	FT-16SN08050101	$13,000	$47,594	$60,594
1.02.08.05.01	Organize repository design assessment information - SRNL	FT-16SR08050102	$33,000	$0	$33,000
1.02.08.05.01	Update inventories for DOE managed HLW and SNF - SNL	FT-16SN08050103	$20,000	$62,481	$82,481
1.02.08.05.01	Complete and populate online waste library (OWL) - SNL	FT-16SN08050104	$100,000	$66,900	$166,900
1.02.08.05.01	Characterize alternative waste forms long-term performance - SNL	FT-16SN08050105	$133,000	$0	$133,000
1.02.08.05.02	**Preliminary Design Concepts**				
1.02.08.05.02	EBS concepts and thermal analysis - SNL	FT-16SN08050201	$120,000	$56,354	$176,354
1.02.08.05.02	EBS concepts and thermal analysis - SRNL	FT-16SR08050202	$33,000	$0	$33,000
1.02.08.05.02	Disposal overpack & waste package options - SNL	FT-16SN08050203	$120,000	$0	$120,000
1.02.08.05.02	Repository layout and waste package emplacement - SNL	FT-16SN08050204	$15,000	$0	$15,000
1.02.08.05.03	**Organizational and Procedural Frameworks**				
1.02.08.05.03	Program Planning - SNL	FT-16SN08050301	$80,000	$0	$80,000
1.02.08.05.03	Establish organizational framework to meet regulator expectations - SNL	FT-16SN08050302	$306,000	$59,645	$365,645
1.02.08.05.03	Develop and implement operating procedures - SNL	FT-16SN08050303	$200,000	$26,609	$226,609
1.02.08.05.03	Interactions with regulator - SNL	FT-16SN08050304	$0	$0	$0
1.02.08.05.04	**Safety Analysis and Technical Site Evaluation**				
1.02.08.05.04	Complete reference cases for each geologic medium - SNL	FT-16SN08050401	$147,000	$0	$147,000
1.02.08.05.04	FEPS analysis - SNL	FT-16SN08050402	$147,000	$0	$147,000
1.02.08.05.04	FEPS analysis - LANL	FT-16LA08050403	$67,000	$0	$67,000
1.02.08.05.04	Define generic safety/performance objectives - SNL	FT-16SN08050404	$0	$0	$0
1.02.08.05.04	Evaluate alternative EBS concepts - SNL	FT-16SN08050405	$173,000	$0	$173,000
1.02.08.05.04	Total system performance assessment - SNL	FT-16SN08050406	$173,000	$0	$173,000
1.02.08.05.04	Document preliminary technical site evaluation plan - SNL	FT-16SN08050407	$0	$0	$0
1.02.08.05.04	Preliminary regional geology evaluation - LANL	FT-16LA08050408	$120,000	$0	$120,000
	DOE Managed HLW and SNF Research Total		**$2,000,000**	**$319,583**	**$2,319,583**

Summary of D-Repo Milestones

- **Inventory and Waste Characterization**
  - M2: The On-line Waste Library (OWL): Usage and Status Report (SNL, 9/23/2016)
  - M4: Inventory Input Report (SRNL, 7/29/2016)
- **Preliminary Design Concepts**
  - M2: Status of Progress Made Toward Preliminary Design Concepts for the Inventory in Select Media for DOE Managed HLW/SNF (SNL, 9/30/2016)
  - M4: Decay Heat of Selected Defense Waste Materials (SRNL, 7/29/2016)
- **Organizational and Procedural Frameworks**
  - M2: Draft Program Plan for the Permanent Disposal of High-Level Radioactive Waste and Spent Nuclear Fuel from Defense and Department of Energy Research and Development Activities (SNL, 7/29/2016)
  - M2: Generic Organizational and Procedural Framework for DOE Managed HLW and SNF Licensing (SNL, 9/16/2016)
- **Safety Analysis and Technical Site Evaluations**
  - M2: Status of Progress Made Toward Safety Analysis and Technical Site Evaluations for DOE Managed HLW and SNF (SNL, 11/3/2016, i.e., in FY17)
  - M4: Preliminary Regional Site Evaluations for Disposal of DOE-Managed HLW and SNF (LANL, 9/16/2016)

Integration Linkages



Meeting Agenda (SNL Bldg. 823, Rm 2279)

1:00 - 1:10 pm – *Introduction* (Sevougian/McMahon)

1:10 - 1:50 pm – *Status of D-Repo granite reference case* (Stein, discussion lead)
- Relationship of D-Repo to GDSA C-Repo
- Discussion of FCM/DFN and permeability heterogeneity in far-field/near-field
- Current layout and repository design of D-Repo being used in PA-PFLOTRAN
- Waste forms and waste packages currently included in simulations

1:50 - 2:30 pm – *Inventory status* (Sassani, discussion lead)
- Inventory/thermal heterogeneity proposed by SNL and, as delivered, by Carter (SRNL)
- Discussion of inclusion of SRNL inventory/thermal heterogeneity in PA

2:30 - 3:15 pm – *EBS Design Concepts Discussion* (Matteo/Hardin, discussion leads)
- Proposed WP/EBS alternative designs (including buffer)
- Proposed alternative repository layouts
- Proposed metrics to choose an optimum design/layout
- Relationship to current PA design
- Status of thermal analyses (Hadgu)

3:15 - 3:30 pm – *Break*

3:30 - 3:50 pm – *Update on LANL Regional Geology Work Package* (Perry)
- Regional geologic evaluations (for granite host rock) for disposal of DOE-managed HLW and SNF

3:50 - 4:10 pm – *Status of Organizational and Procedural Frameworks WP* (Appel)

4:10 - 4:30 pm – *Planning for UFD June Meeting*

Draft Agenda for D-Repo Session in UFD June Working Group Meeting

- **Thursday morning, June 9, 10:10 am – 12:00 noon**
- **Similar to today's agenda, and a report on status/progress:**

10:10 - 10:20 am – *Introduction* (Sevougian/McMahon)

10:20 - 10:50 am – *Status of Safety Analysis* (Stein)

10:50 - 11:10 am – *Status of Inventory and Waste Characterization* (Sassani)

11:10 - 11:30 am – *Status of EBS Design Concepts* (Matteo)

11:30 - 11:45 am – *Status of Regional Geology* (Perry)

11:45 - 12:00 noon – *Status of Organizational and Procedural Frameworks* (Appel)

Work Packages under 1.02.08.05.04: *Safety Analysis and Technical Site Evaluations*

OBJECTIVES:

Work activities in this control account address the technical elements necessary to establish a safety case for disposal of DOE-managed HLW and SNF in one or more of the selected disposal concepts under investigation in the Used Fuel Disposition Campaign: mined disposal in salt, argillite, and crystalline formations, and deep borehole disposal in crystalline basement rock. These technical elements will be dependent upon, and integrated with, the preliminary EBS design concepts and waste inventories being developed under other control accounts within WBS 1.02.08.05. An emphasis will be placed on safety case elements necessary to support site selection and evaluation.

Work Packages:

- WP1 (SNL): Augment reference cases being developed under the GDSA work package (FT-16SN030401) for selected geologic media currently under investigation in the Used Fuel Disposition Campaign (salt, argillite, crystalline, and deep borehole). As appropriate, particularly as related to a repository for DOE-managed high level wastes, include additional geologic information being developed under FT-16SN050407 and additional design information being developed under WBS 1.02.08.05.02. *Team= Sevougian, Gross, Stein, Mariner, TBD*
- WP2 (SNL): Perform Features, Events and Processes (FEPs) analyses for selected geologic media, including FEPs related to the EBS design concepts under development in WBS 1.02.08.05.02 and the waste inventory being characterized in WBS 1.02.08.05.01. Evaluate FEPs that are relevant to safety assessment analyses related to site selection and evaluation for a repository for DOE-managed high level wastes. *Team = Gross, Sevougian, Mariner, TBD*
- WP3 (LANL): Synthesis of colloid formation and colloid-facilitated radionuclide transport work: LANL will focus on colloid transport; LLNL will focus on colloid stability; and SNL will focus on the implication of nanogeochemistry to colloid stability and radionuclide transport. The work will be documented in a level 3 milestone report (led by LANL). LANL efforts under this task will also include interactions with PA modelers to incorporate FEPs relevant to colloid-facilitated radionuclide transport into PA models. *Team = Reimus et al.*

Work Packages under 1.02.08.05.04 (cont.): *Safety Analysis and Technical Site Evaluations*

Work Packages (cont.):

- ~~WP4 (SNL): Define generic post-closure safety performance objectives and metrics, tailored toward the site-selection and site-evaluation phases of a repository development program. *Team= Mariner, Sevougian*~~
- WP5 (SNL): Evaluate alternative Engineered Barrier Systems (EBS) concepts for selected geologic media, particularly as related to a repository for DOE-managed high level wastes, based on the reference cases developed under FT-16SN050401, the performance objectives/metrics developed under FT-16SN050404, the performance assessment model to be developed under FT-16SN050406, and the preliminary design concepts developed and examined in WBS 1.02.08.05.02. *Team= Hardin, Sevougian, Hammond, Stein, TBD*
- WP6 (SNL): Augment the GDSA performance assessment (PA) model and analyses developed under WBS 1.02.08.03.04, as needed, to analyze a repository for DOE-managed waste. As appropriate, perform preliminary deterministic and probabilistic analyses of system performance. Conduct initial sensitivity analyses with the PA model to examine FEPs and input parameters that have an important impact on performance metrics developed under FT-16SN050404. These FEPs, either natural system or engineered system FEPs, will be candidates for further uncertainty reduction through continued R&D. Includes the L2 Milestone due on 11/3/2016. *Team= Stein, Hammond, Sevougian, TBD*
- ~~WP7 (SNL): Develop a technical site-evaluation plan, which describes the suite of activities necessary to gather the information required for a post-closure safety assessment and to support the safety case. This evaluation plan will specify activities required for sites with little previous geologic information as well as those that may already be well characterized. It will include a review of the existing environmental and regulatory framework that is applicable to siting a repository for the permanent disposal of high-level radioactive waste and spent nuclear fuel from defense and DOE research and development activities. *Team= Kuhlman, Sevougian*~~
- WP8 (LANL): * Continued development, refinement and documentation of the Regional Geology GIS database for selected geologic media currently under investigation within the Used Fuel Disposition Campaign (argillite, crystalline, deep borehole and salt). * Support Development a technical site evaluation plan. * Perform regional geologic evaluations for technical site selection options for disposal of DOE-managed HLW and SNF. *Team= Perry et al.*