Spent Fuel and Waste Science and Technology

DR Integration Introduction

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The disposal of SNF and HLW in a variety of geologic media was investigated in the U.S. prior to 1987 and internationally.

U.S. efforts for twenty-plus years focused on disposal at Yucca Mountain, Nevada.
Status of Disposal Research: Background
How did DOE get to the LA submittal?

- **Concept Evaluation**: Evaluate Disposal Concepts; FEPs; Develop and Demonstrate Technologies; Generic RD&D
- **Site Selection/Characterization**: Development of Siting Guidelines/Criteria, Identification of Potential Sites, Progressive Site Down-Selection, Site Characterization

**Generic** → Assessment Bases → Final

**Safety Assessments**

**Safety Case License**

**Application and Review**

*LA for construction reviewed and granted*
Developing the Safety Case and LA

Identify and Screen FEPs and Scenarios

- Scenario 1
- Scenario 2
- Scenario 3

Select

Reject

Develop Models and Abstractions

- Unsaturated Zone Flow
- Waste Package Corrosion
- Waste Form Degradation
- Saturated Zone Flow and Transport
- Biosphere
- Disruptive Events

Estimate Parameter Ranges and Uncertainty

- Climate Change
- Rock Porosity
- pH

Construct Integrated TSPA Model and Perform Calculations

Evaluate Performance

- Performance Assessment Consequence
- Compare Results to Regulations
A comprehensive disposal R&D program was initiated in June 2009 by DOE-NE under the Used Fuel Disposition Campaign.

Mission: To identify alternatives and conduct scientific research and technology development to enable storage, transportation and disposal of used nuclear fuel and wastes generated by existing and future nuclear fuel cycles.

FY10 – 11 activities focused on gaining an understanding of other disposal concepts

Completed Roadmap on March 30, 2011, revised Sept 2012

Recognized as a “living” roadmap to be revised to update the status and prioritization of R&D needs as progress is made in the R&D program

FY 18 and 19 – Status Progress and Revaluate Priorities
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DR Integration and Prioritization

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Existing and New Designs
EBS, A, C, S, DPC

Reference Cases
EBS, A, C, S, DPC

EBS, Arg, Crys, Salt, DPC

GDSA
Goals

1. Improved integration among DR work packages
2. Continued integration with and support of performance assessment (GDSA) and safety case
3. Summary of what has been accomplished since 2012 UFD Roadmap vis-à-vis Roadmap priorities
4. Identify potential gaps in R&D activities vis-à-vis Roadmap priorities
5. Possible adjustments of R&D priorities and activities
6. Initial preparation for 1st-quarter FY19 integration and R&D prioritization workshops
   - Workshops to produce summary documents of accomplishments and potential gaps
   - Workshops to further model integration efforts with GDSA and among WPs
7. FY19 M2 report that summarizes DOE’s progress and capabilities, provides a synthesis of R&D accomplishments, and identifies gaps in current understanding