SAND2015-4047PE

Used Fuel Disposition R&D Campaign

Used Fuel Disposition R&D Campaign Working Group Meeting

Introduction

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Used Fuel Disposition R&D Campaign

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Sandia National Laboratories is a multiprogram laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND2015-xxxx

Used Fuel Disposition

Outline of Presentation

- **Meeting Objectives and Approach**
  - What's different this year
- **Where we fit in the DOE Office of Nuclear Energy**
  - Mission and Objectives
  - Evolving national policy
- **Current Status of the UFD campaign**
  - FY15 organization
  - FY16 planning

Meeting Objectives

- **Objectives**
  - Address communication challenges
    - *Geographically dispersed team*
    - *Broadly focused mission*
    - *Diverse R&D topics*
  - Communication between campaign management and researchers
    - *Provide clear information about strategic plans, budget possibilities, R&D needs*
  - Communication between lab and federal staff
    - *Accomplishments for FY15, plans for FY15*
  - Communication among multiple campaigns and crosscutting activities
    - *Used Fuel Disposition, Nuclear Fuel Storage and Transportation Planning Project, Material Recovery/Waste Form, Fuel Cycle Options, QA*
    - *DOE National Energy Technology Laboratory (NETL)*
  - Communication among National Lab and University researchers
    - *Researchers from the NE University Programs are here*

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Meeting Approach

- **Full-group presentations today and Thursday afternoon**
  - Opportunity for campaign management to provide basic information and strategy
  - Opportunity for questions and discussion; all topics are welcome
  - Programmatic Updates: documentation and quality assurance
  - NE University Program Researchers (NEUP)
    - *Separate presentation by JC de la Garza*
- **Topical break-out sessions Wednesday afternoon and Thursday morning**
  - In-depth discussions
  - Space is available for impromptu meetings: contact campaign management for help
- **Reconvene as a full group for Thursday afternoon session**
  - Updates from other campaigns: NFST, Fuel Cycle Options, Material Recovery/Waste Forms
  - Updates from the Storage/Transportation and Disposal Leads
  - Closing comments

Used Fuel Disposition R&D Campaign

Mission and Organization of the Campaign

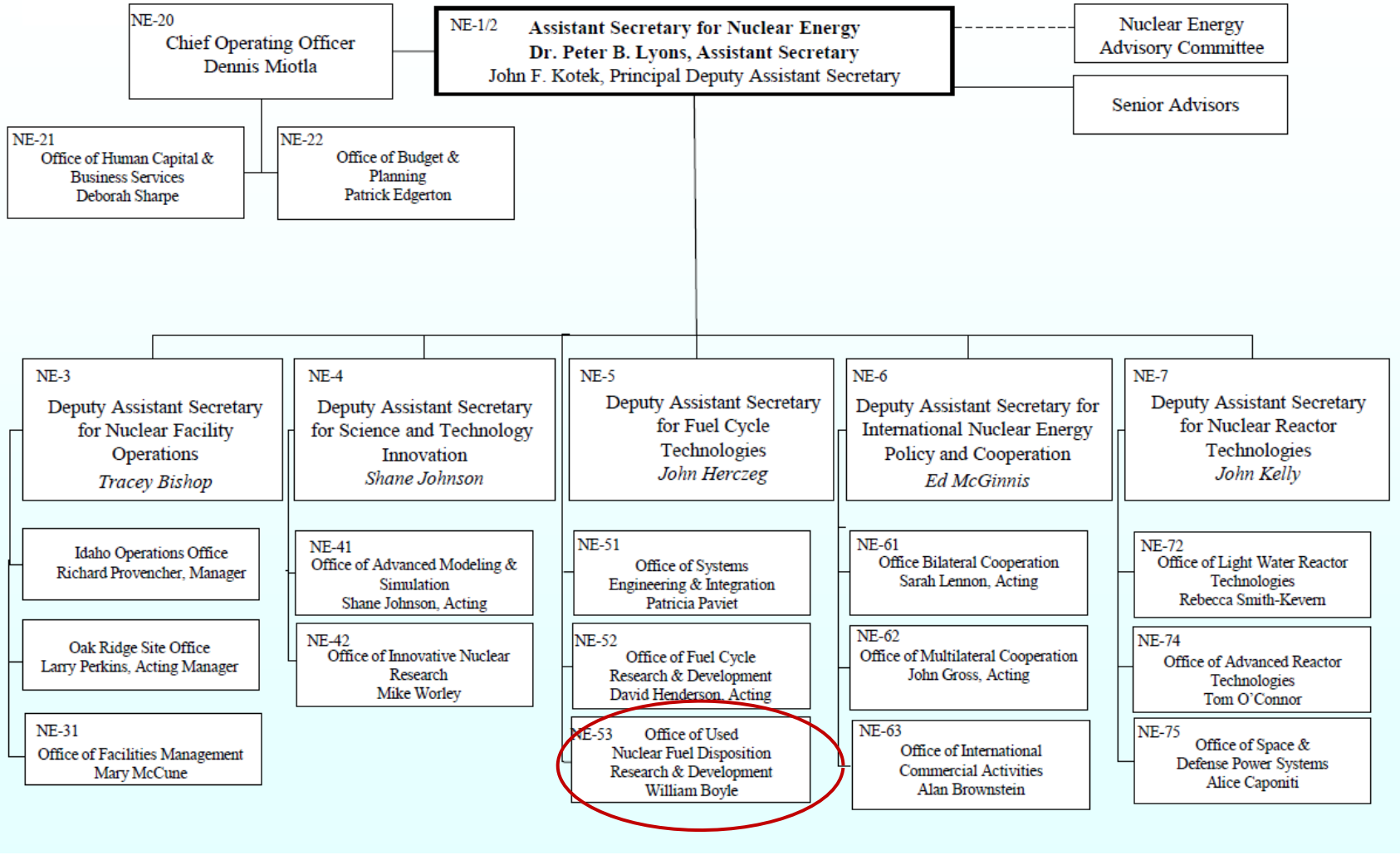
DOE Office of Nuclear Energy Mission Statement

- **The primary mission of the Office of Nuclear Energy is to advance nuclear power as a resource capable of meeting the Nation's energy, environmental, and national security needs by resolving technical, cost, safety, proliferation resistance, and security barriers through research, development, and demonstration as appropriate.**

- **NE's program is guided by the four research objectives detailed in its Nuclear Energy Research and Development Roadmap:**
  - Develop technologies and other solutions that can improve the reliability, sustain the safety, and extend the life of current reactors.
  - Develop improvements in the affordability of new reactors to enable nuclear energy to help meet the Administration's energy security and climate change goals.
  - Develop sustainable fuel cycles.
  - Understand and minimize the risks of nuclear proliferation and terrorism.

Source: http://energy.gov/ne/mission, downloaded 19 May 2015

DOE-NE Organization Chart



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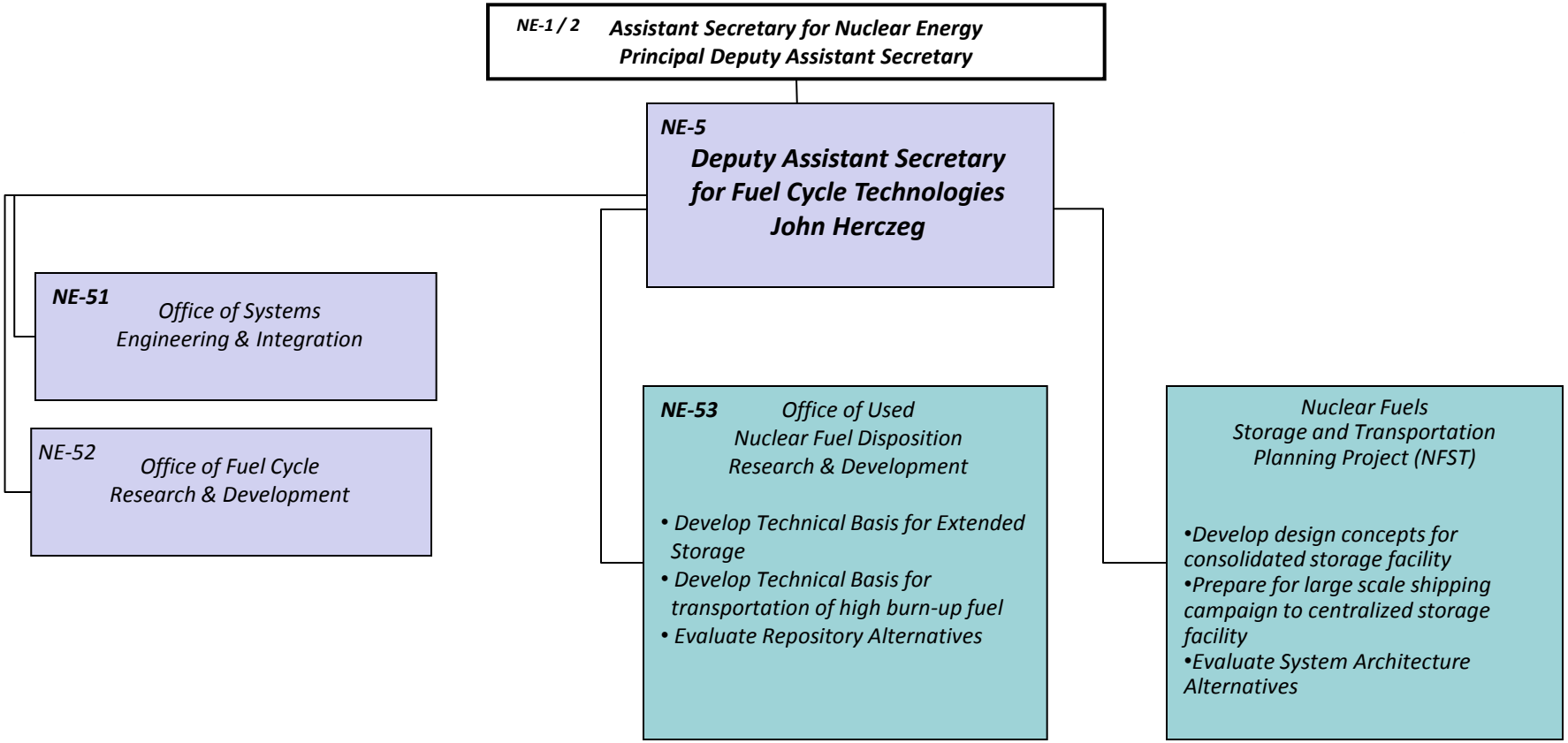
DOE Office of Nuclear Energy
Office of Fuel Cycle Technologies (NE-5)



Used Fuel Disposition R&D Campaign Mission

The DOE Office of Used Nuclear Fuel Disposition Research and Development and nine national laboratories participate in the DOE Office of Nuclear Energy's "Used Fuel Disposition Campaign"

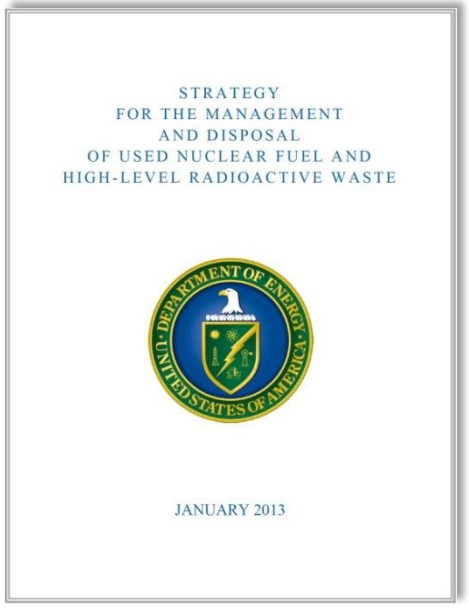
Campaign Mission: to identify alternatives and conduct scientific research and technology development to enable storage, transportation and disposal of used nuclear fuel and wastes generated by existing and future nuclear fuel cycles

Summary of the Administration's UNF and HLW Strategy

Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste **issued January 2013**

The Strategy is:

- **A statement of Administration policy regarding the importance of addressing the disposition of used nuclear fuel and high-level radioactive waste**
- **The response to the final report and recommendations made by the *Blue Ribbon Commission on America's Nuclear Future***
- **The initial basis for discussions among the Administration, Congress and other stakeholders**



The Strategy outlines a 10-year program of work that:

- Sites, designs, licenses, constructs and begins operations of a pilot interim storage facility (operating 2021)
- Advances toward the siting and licensing of a larger interim storage facility (operating 2025)
- Makes demonstrable progress on the siting and characterization of repository sites (repository sited 2026, licensed 2042, operating 2048)

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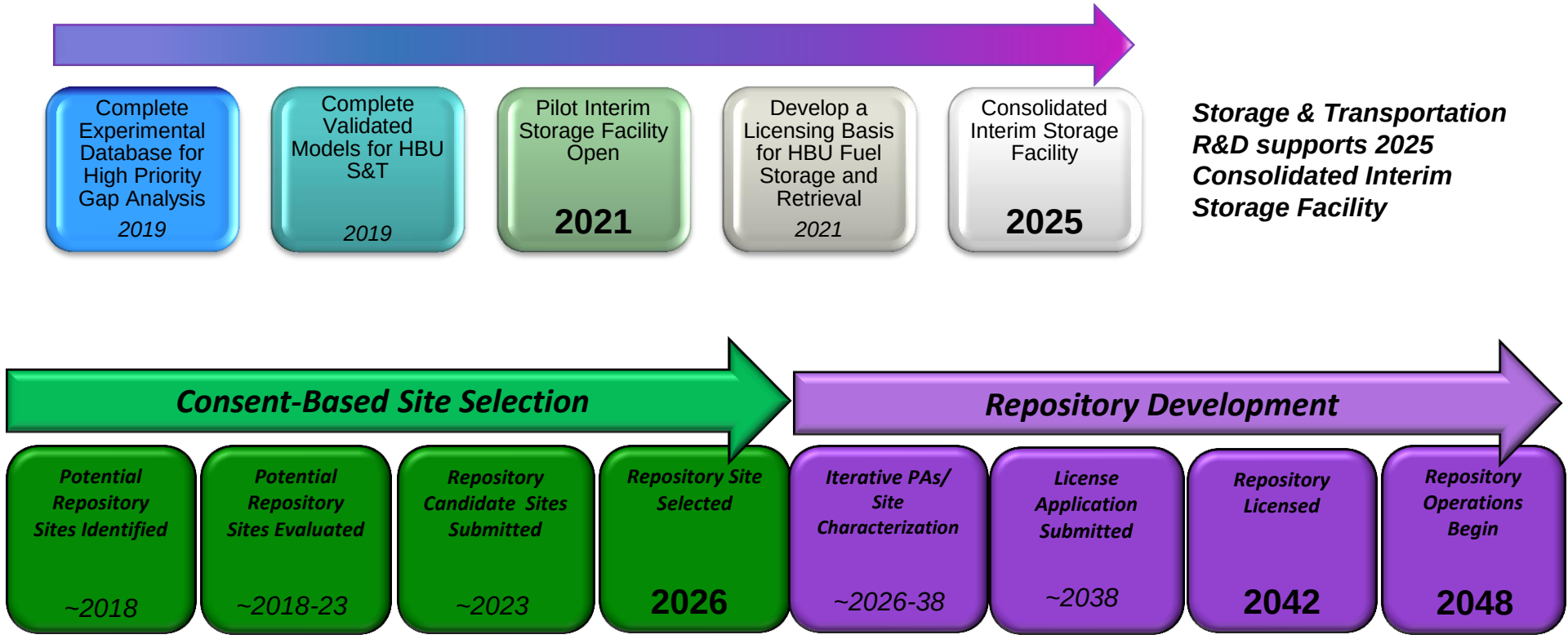
R&D Path to Support DOE Waste Management Strategy



Storage & Transportation R&D supports 2025 Consolidated Interim Storage Facility

Approximate target dates (in italics) needed to meet milestones (in bold) set out in the 2013 DOE Strategy

Disposal R&D supports 2026 Repository Site Selection and 2042 Repository Licensing

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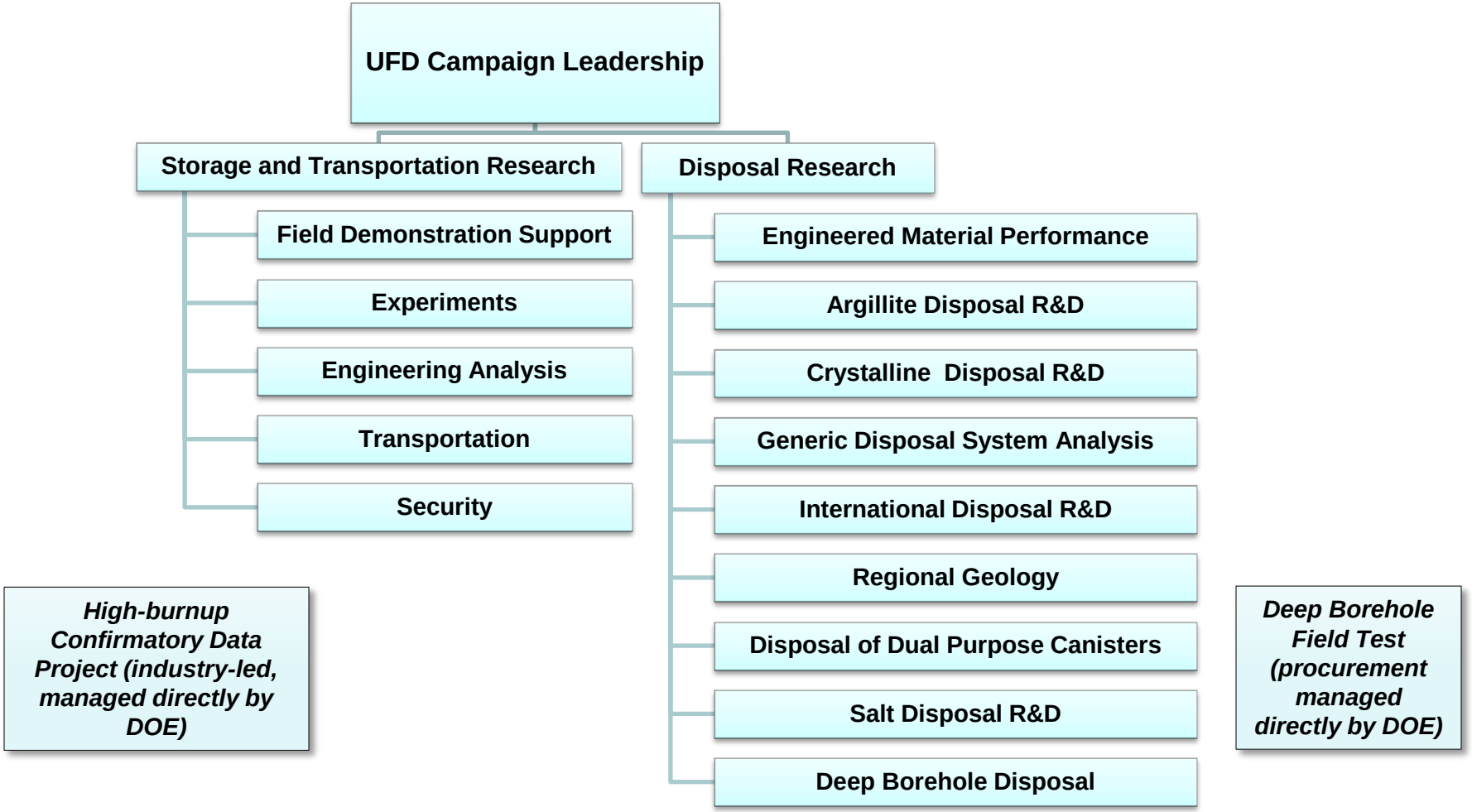
Campaign Structure



UFD R&D Campaign 2009-Present

- FY09 Planning meeting at Argonne National Laboratory, June 2009
- FY10 R&D funding at $7.1 M (all in Disposal Research)
- FY11 R&D funding at $23.8 M
  - Nine national laboratories participating in UFD
  - Significant R&D program in Storage, including Transportation
- FY12 R&D budget baseline at $22.8 M, end-of-year actual ~$37 M
  - Some elements of FY12 work scope not established until fourth quarter
- FY13 R&D $23.5 M
  - Nuclear Fuel Storage and Transportation Planning Project initiated
  - Storage demonstration R&D initiated external to UFD R&D campaign
- FY14 R&D $27.0 M ($23.2 M at national labs, $3.8M at industry)
  - Redirection of scope within campaign increases Storage and Transportation and decreases Disposal Research
- FY15 R&D Baseline at $28.6 M ($20.1 M at national labs, $8.5 M at DOE and Industry)
  - Significant redirection of scope associated with deep borehole field test and industry high-burnup data confirmation project

Guidance from DOE Regarding FY15 Priorities (July 2014)

- **UFD R&D planning target for FY15 set at $28.6 M**
- **Two highest priorities for FY15 defined to be**
  - DOE/EPRI/Areva/Dominion High Burnup Confirmatory Data Project
  - Deep borehole field test
- **Disposal Research priorities and guidance include**
  - Deep borehole field test: FY15 funding at 6.5M plus $2.5M at DOE HQ, sufficient to support initial drilling in June 2016
  - Adequate funding to support existing international activities
  - Funding for research in crystalline, argillite, and salt media should be roughly equivalent
  - Preliminary repository siting program will not be funded in FY15
- **Storage and Transportation priorities and guidance include**
  - EPRI contract: $6M
  - National Laboratory support for confirmatory data project
  - Storage—small scale and separate effects testing
  - Transportation—much smaller in scale than storage activities
  - Security—lower priority for R&D than other Storage and Transportation topics

Implementing UFD R&D Priorities from FY14 to FY15

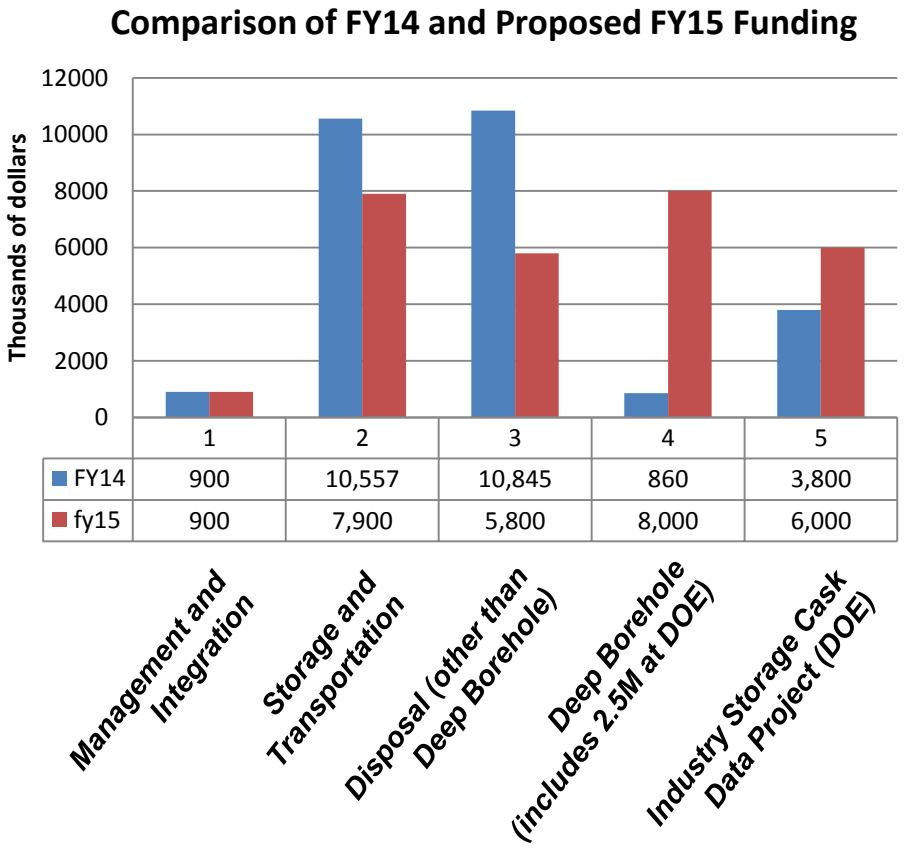
Overall funding for UFD R&D (including campaign and DOE managed activities) increases from ~ $27M to $28.6M

Increase in funding for storage high burnup data project and proposed deep borehole field test cause changes in other activities

Storage and Transportation R&D outside of high burnup data project decreases ~ 26%

Disposal Research other than deep borehole decreases ~ 42%

International collaborations remain a high priority within the reduced funding



Used Fuel Disposition R&D Campaign

FY16 Planning

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From the FY16 President's Budget Request (Volume 3, p. 438-439)

FCR&D's Used Nuclear Fuel Disposition (UNFD) subprogram will continue to conduct scientific research and technology development to enable storage, transportation, and disposal of UNF and wastes generated by existing and future fuel cycles. Because of the evolution of the domestic UNF inventory, special emphasis is placed on understanding the behavior of high-burnup fuels. In FY 2016, funding increases significantly for R&D on the concept of waste disposal in deep boreholes in crystalline basement rock. The Department will initiate a field test that will include the drilling of a characterization borehole at a volunteer site that will be selected in the future.

In January 2013, the Administration released its *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste (Strategy)*. In FY 2016, the budget requests $30.0 million in the integrated waste management system element of the UNFD subprogram to support preliminary generic process development and other non-R&D activities related to storage, transportation, and consent-based siting, including $24.0 million from the Nuclear Waste Fund. In addition, for the R&D element of the UNFD subprogram, the Department requests $75.4 million for storage, transportation, and disposal related research and development.

…

In FY 2016, the Department requests $3.0 million for a new UNFD subprogram element: DOE-Managed High-Level Radioactive Waste (HLW) and Spent Nuclear Fuel (SNF). This new subprogram element will include activities associated with exploring potential alternative disposal options for some DOE-managed HLW and SNF.

(emphasis added)

From the FY16 President's Budget Request (Volume 3, p. 441)

Total requested increase for UFD R&D and NFST combined is $36.86 M

$18 M increase for deep borehole field test (brings DBH total to 26 M)

$8 M increase for facility modifications at Idaho Site (brings total to 17 M)

$7.5 M increase for integrated waste management system activities

$3 M for a new subprogram for exploring alternative disposal options for some DOE-managed HLW and SNF

Used Nuclear Fuel Disposition: The increase from $71,500,000 to $108,360,000 is to fund significant increases in the following activities: **+36,860**

- Initiate a field test to examine the viability of large diameter, deep borehole disposal of high-level waste (+$18,000,000). The field test will include the drilling of an experimental borehole at a volunteer site that will be selected in the future. The additional funding is required for drill site preparations, permitting, drilling operations (contractor, equipment, and crew), and down-hole scientific testing.
- Initiate facility modifications to an INL facility in order to handle and examine existing on-site large dry storage casks (+$8,000,000). Preliminary analysis of an INL facility indicates that it has capability to handle those casks. The feasibility studies and conceptual design studies will be completed in FY 2015. Once completed and if successful, the Department proposes to continue to the next stage of activities in FY 2016; including modifications to the receiving area, primary containment structure, and fuel-handling cave.
- Expand integrated waste management system activities (+$7,500,000) to support the Administration's *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste (Strategy)*.
- Initiate a new UNFD subprogram for activities associated with exploring potential alternative disposal options for some DOE-managed HLW and SNF. (+$3,000,000).

Additional detail on 12 specific activities within UFD R&D provided in pages 454-455 of the FY16 Budget Request Volume 3.

From the FY16 House Appropriations Committee Report

- **$200 M for Yucca Mountain**
  - $150 M for DOE to “support the Yucca Mountain High-Level Waste Geologic Repository”
  - $50 M for NRC “to support the continued adjudication of the Yucca Mountain license application”
- **$55 M for Used Nuclear Fuel Disposition (R&D plus implementation)**
  - $53.36 below DOE’s request
  - All funds for R&D, “no funding is provided for integrated waste management system activities or new activities related to Department of Energy-Managed High Level Waste and Spent Nuclear Fuel.”
  - $6 M of the $55 M to “support activities to design and certify a rail car or cars…”
  - $ 7 M of the $55 M to “support preparation activities for testing of high burnup fuel”

What does this mean for FY16 Planning?

- **Actual budgets will be determined by Congressional appropriation**
- **The $75.4 M target in the President's Budget for "storage, transportation, and disposal related research and development"**
  1. Is "pretax"
     - *Roughly 30% of NE's R&D appropriations in the past have gone to NE University Programs (20%), Small Business Innovation Research/Technology Transfer (SBIR/STTR), and other activities*
  2. Includes specified activities outside the National Laboratories
     - *Continued support for the DOE-EPRI storage collaboration*
     - *Continued support for the facility modifications at the Idaho Site*
     - *Significant contractor costs associated with the deep borehole field test*
- **Formal guidance has not been provided from DOE for FY16 planning, but total UFD R&D funding at National Laboratories is likely to increase modestly in FY16 relative to FY15 because of the increase associated with the deep borehole field test. Most other R&D areas are likely to remain roughly level**
- **Shifting priorities will impact some areas more than others**

Used Fuel Disposition

Schedule for FY16 Planning

- June 2015: Guidance from NE to the Campaigns with targets and priorities
- July 2015: Campaign management works with NE-53 to prepare FY15 plan at the control account level
- July 28-29, 2015: NE-5 Budget Planning Review
- August-September 2015: Preparation of final FY16 planning packages

Questions and Discussion?