

Used Fuel Disposition R&D Campaign

Used Fuel Disposition R&D Campaign Working Group Meeting

Introduction and Summary

Peter Swift

National Technical Director

Used Fuel Disposition R&D Campaign

Las Vegas, Nevada

June 7, 2016

■ **What's different this year?**

- More emphasis on breakout sessions, fewer sessions as a group

■ **Summary of the UFD campaign**

- Mission and Objectives
- FY16 organization
- FY17 planning

Meeting Outline

■ Full-group presentations today

- Opportunity for campaign management to provide basic information and strategy
- Opportunity for questions and discussion; all topics are welcome
- Nuclear Fuel Storage and Transportation Planning Project (Mark Nutt)
- Quality Assurance Update (Ram Murthy)
- NE University Program Researchers (NEUP)
 - *Introduction by JC de la Garza*

■ Topical break-out sessions begin later today and continue through Thursday morning

- In-depth discussions
- Space is available for impromptu meetings: contact campaign management for help

■ Reconvene as a full group Thursday noon

- Closing comments

Used Fuel Disposition R&D Campaign

Mission, Objectives and Organization

DOE Office of Nuclear Energy Mission Statement

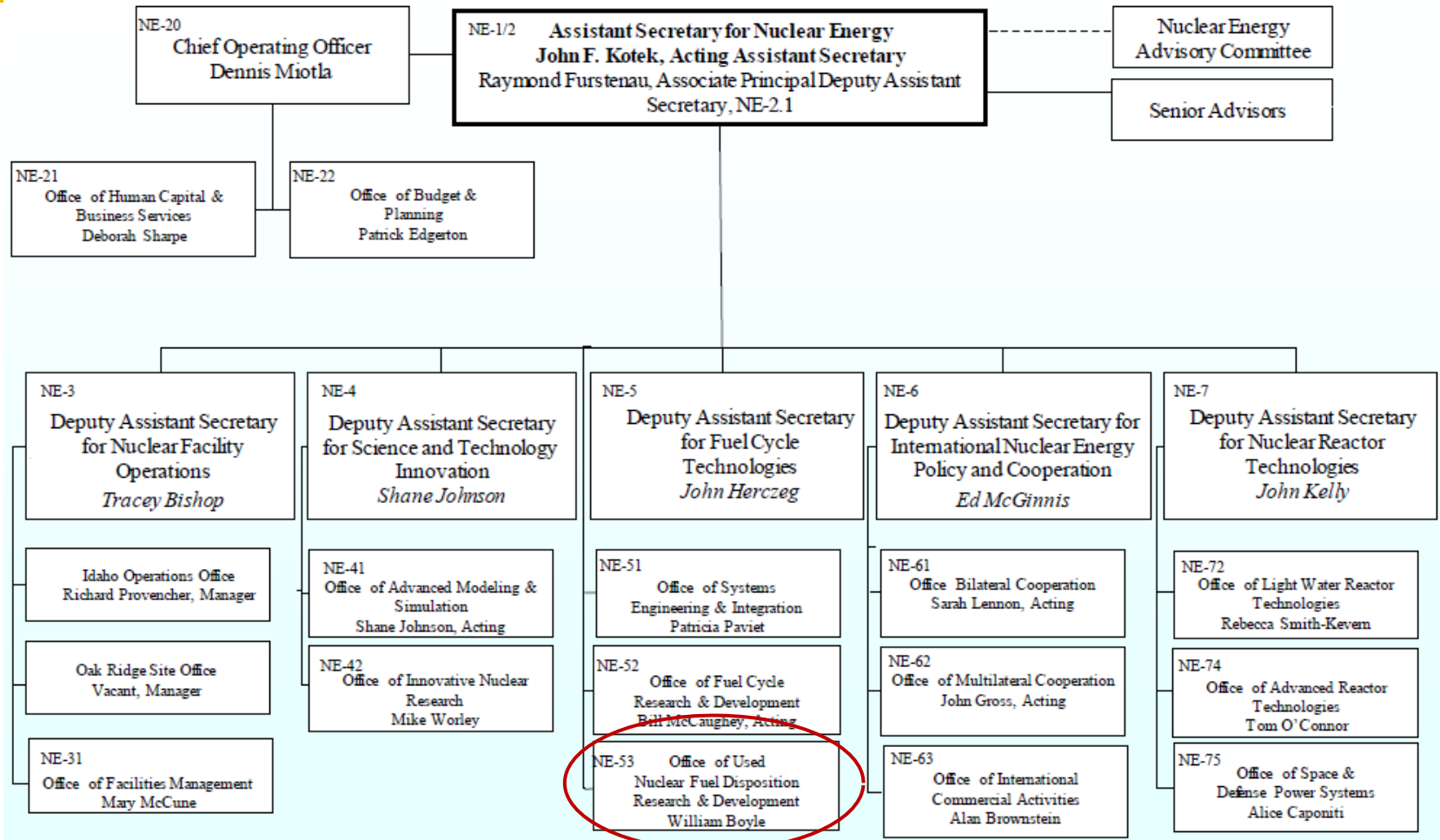
- **The primary mission of the Office of Nuclear Energy is to advance nuclear power as a resource capable of meeting the Nation's energy, environmental, and national security needs by resolving technical, cost, safety, proliferation resistance, and security barriers through research, development, and 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 2 May 2016

Used Fuel Disposition

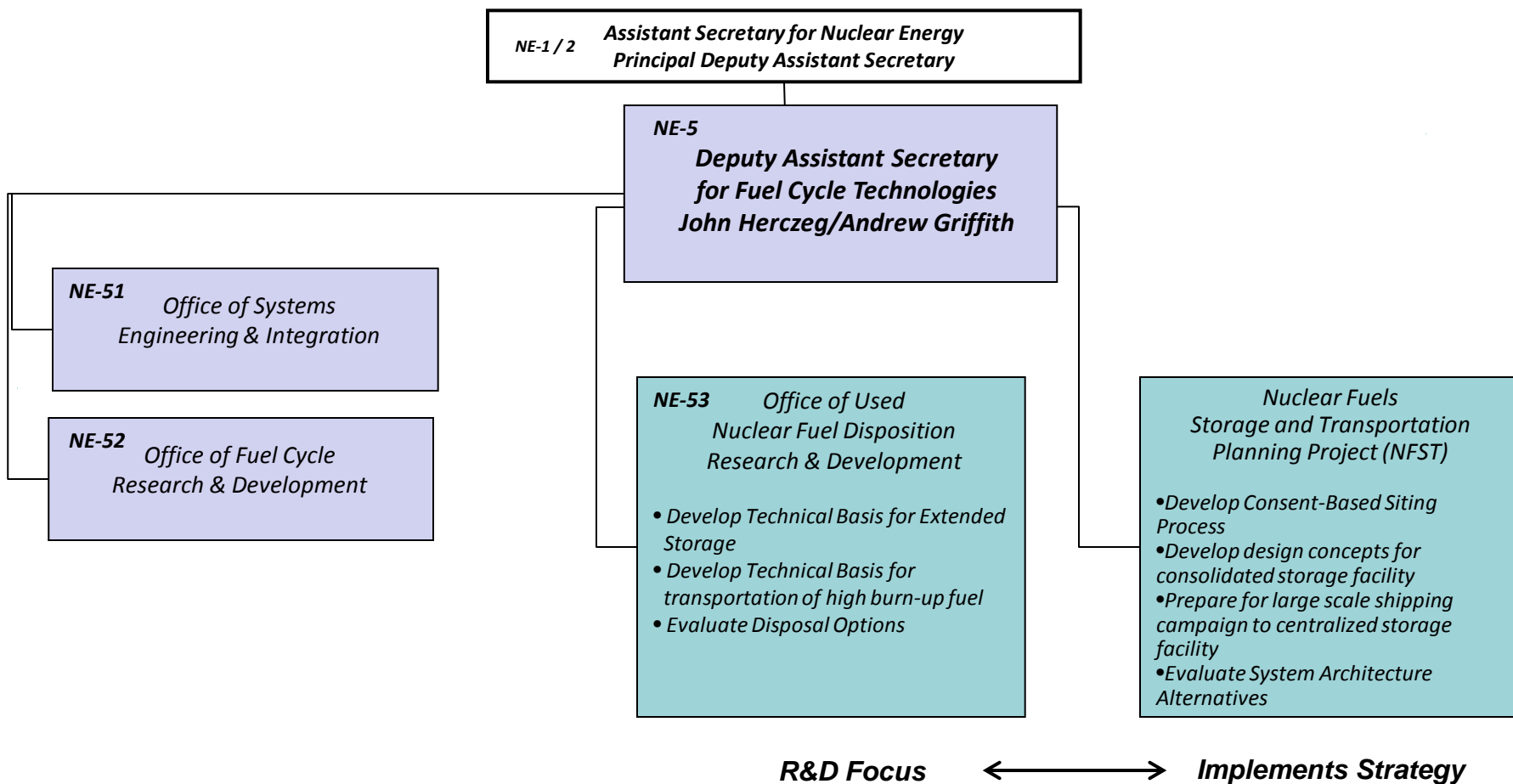
DOE-NE Organization Chart



DM#219073

Used Fuel Disposition

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



Used Fuel Disposition

Used Fuel Disposition R&D Campaign Mission

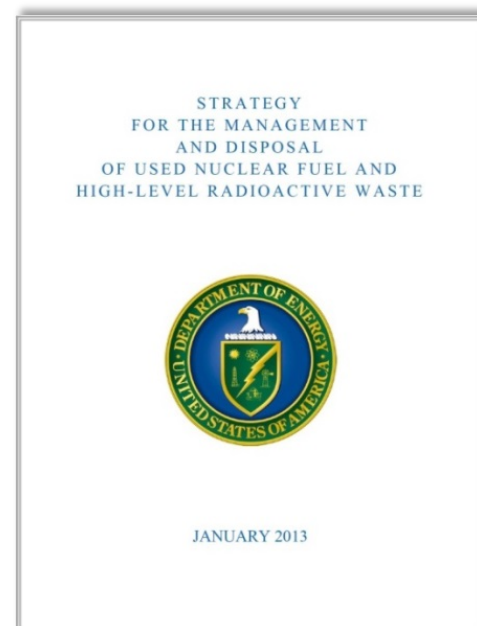
The DOE Office of Used Nuclear Fuel Disposition Research and Development and nine national laboratories participate in the DOE Office of Nuclear Energy's "Used Fuel Disposition Campaign"

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



- Support the implementation of a full-scale NRC-licensed confirmatory storage demonstration facility, in collaboration with industry
- Develop the technical basis necessary to support eventual transportation of used nuclear fuel, including high-burnup fuel
- Support the DOE's development of an Integrated Waste Management System that leads to implementation of integrated storage, transportation, and disposal concepts

***Support the Administration's 2013
Strategy for the Management and
Disposal of Used Nuclear Fuel and
High-Level Radioactive Waste***



Storage and Transportation R&D

- Support the high burn-up fuel full-scale storage demonstration project
- Develop understanding of how temperature and pressure affect cladding integrity in high-burnup UNF
 - *Predictive modeling*
 - *Experimentation*
- Develop understanding of how corrosion and stress corrosion cracking affect performance of stainless steel dry storage canisters
 - *Material and environmental data; predictive modeling*
- Characterize external loadings on UNF during normal conditions of transport

Disposal R&D

- Field a deep borehole test
 - *Initiate drilling in 2016, complete testing in 2019*
- Complete evaluation of the direct disposal of dual-purpose canisters
- Develop experimental and modeling basis for understanding long-term performance of disposal systems in argillaceous rock, salt, crystalline rock, and deep boreholes
 - *Leverage international disposal R&D*
- Develop reference cases for generic disposal concepts

DOE HLW and SNF R&D

- Initiate a repository program for disposal of defense HLW and some DOE-managed SNF

■ Collaboration among Fuel Cycle Technology Campaigns

- Full collaboration and shared resources with Nuclear Fuels Storage and Transportation Planning Project (NFST)
- Support for Fuel Cycle Options Campaign
- Close interactions with Material Recovery/Waste Form Campaign
 - *Waste form modeling work transitioning from MR/WF to UFD in FY14*

■ Collaboration with DOE-EM

- Canister concepts for deep borehole disposal

■ Industry (Advisory and Assistance Contracts)

- E.g., Areva; engineering services task for deep borehole field test

■ DOE/Industry Storage High-Burnup Data Project initiated FY13

- Dominion, Areva, Westinghouse

■ EPRI

- Extended Storage Collaboration Program (ESCP) (with NRC, utilities, vendors, and international organizations)

■ NEI

- Meetings to coordinate prioritization of funded activities

■ **Deep Borehole Field Test**

- Battelle-led team includes Schlumberger, Solexperts

■ **International Collaborations**

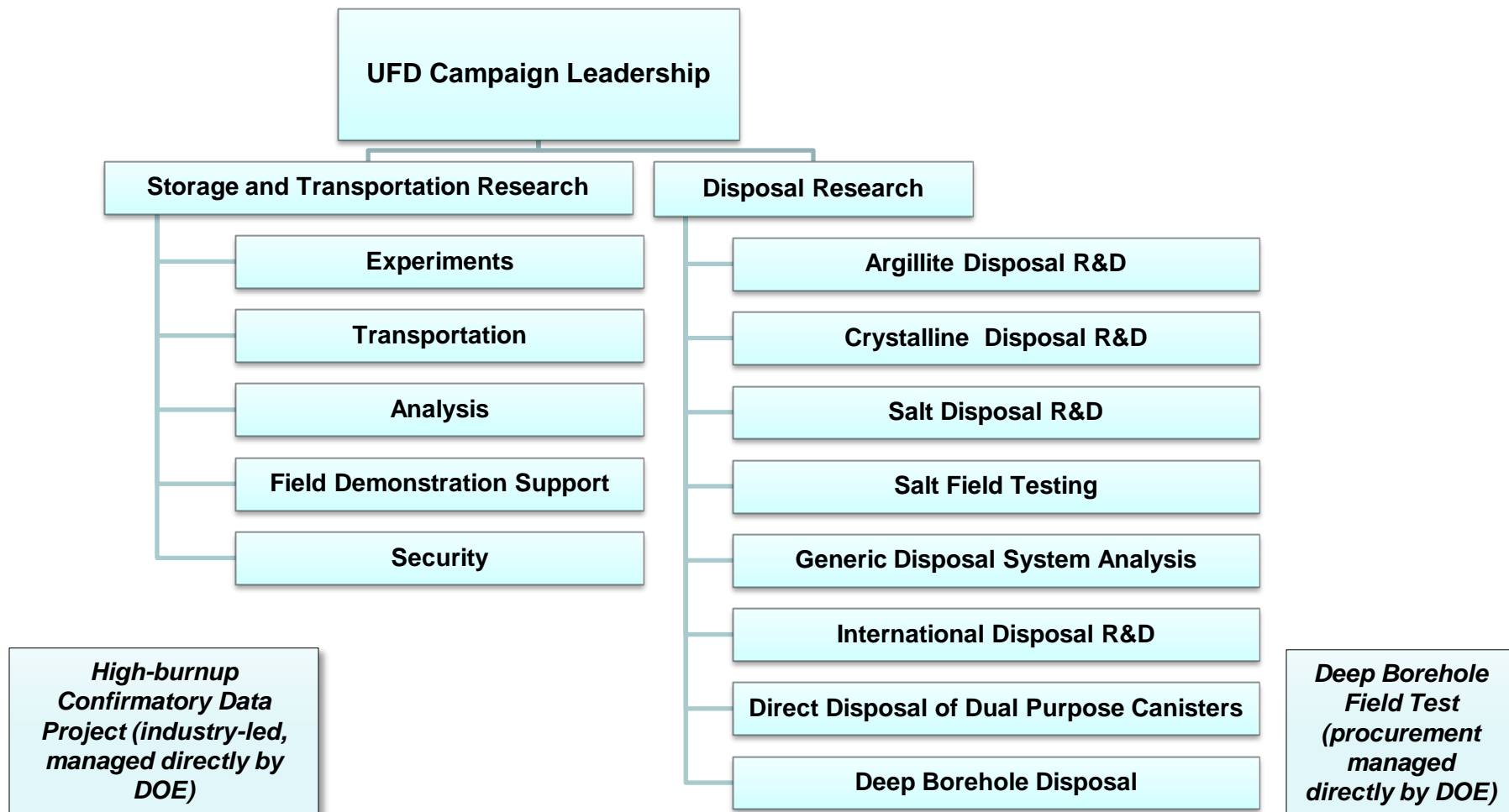
- Participation in international Underground Research Laboratories in Europe and Korea and in multi-national disposal research activities
- Bilateral agreements on storage and disposal R&D with Korea, Japan, China
- MOU for salt disposal R&D with Germany
- IAEA working groups in storage and transportation
- Collaboration with Germany and Japan on extended performance of bolts and seals for bolted storage casks and on SS canister stress corrosion cracking

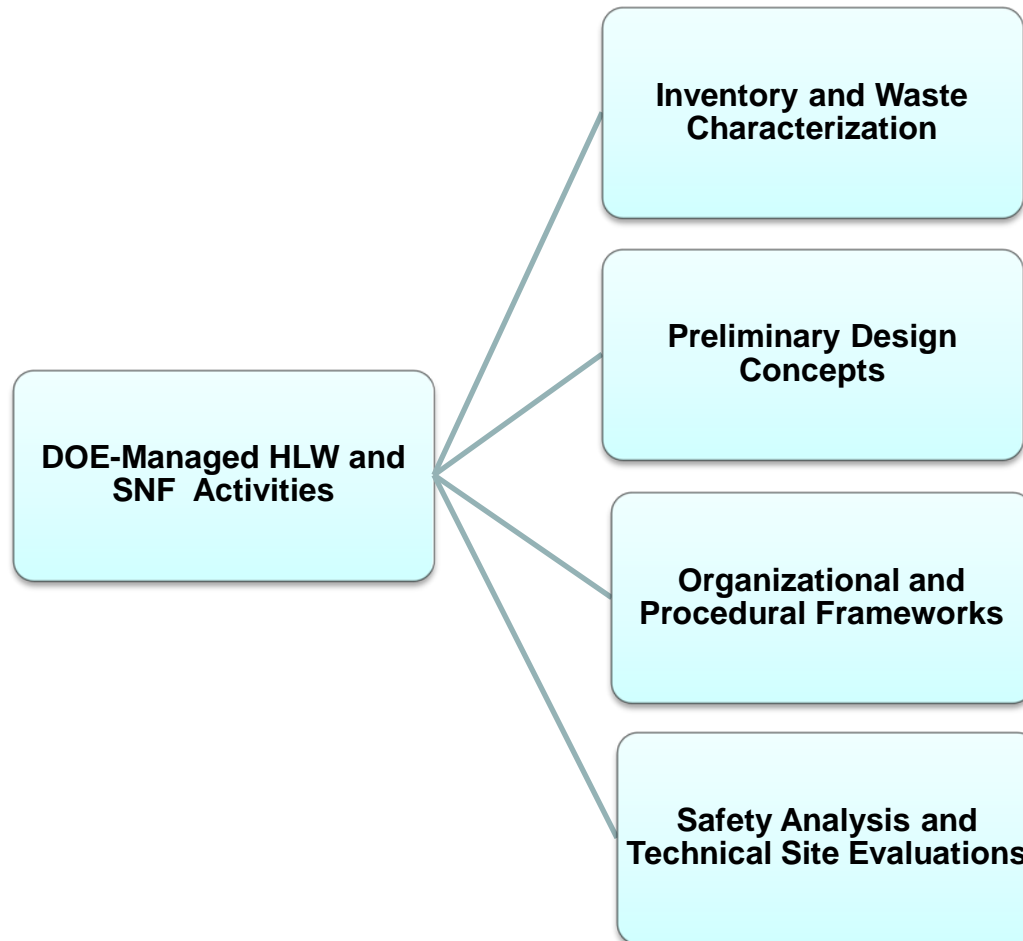
■ **DOE NE University Programs**

- UFD R&D is affiliated with 15 active NEUP research projects (not including FY16 awards)
 - *7 projects in Storage R&D*
 - *1 project in Transportation R&D*
 - *3 projects in Disposal R&D*
 - *4 Integrated Research Projects in Storage R&D*

■ **Other university collaborations (MIT, U. of Oklahoma, University of Sheffield UK)**

UFD R&D Campaign Structure

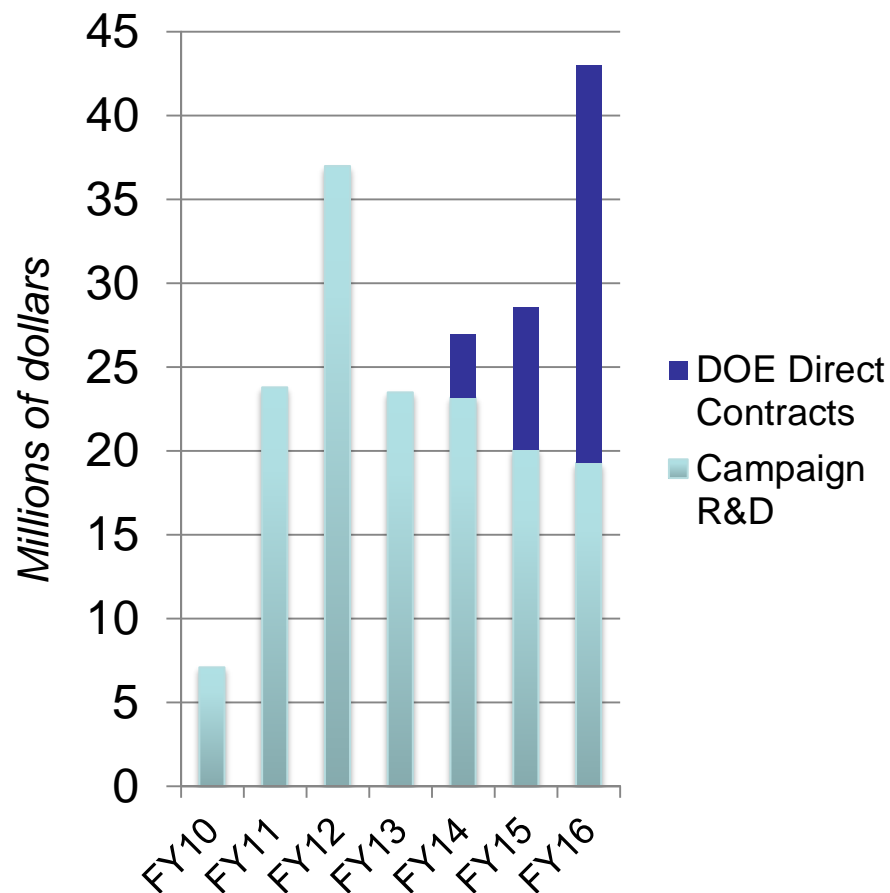




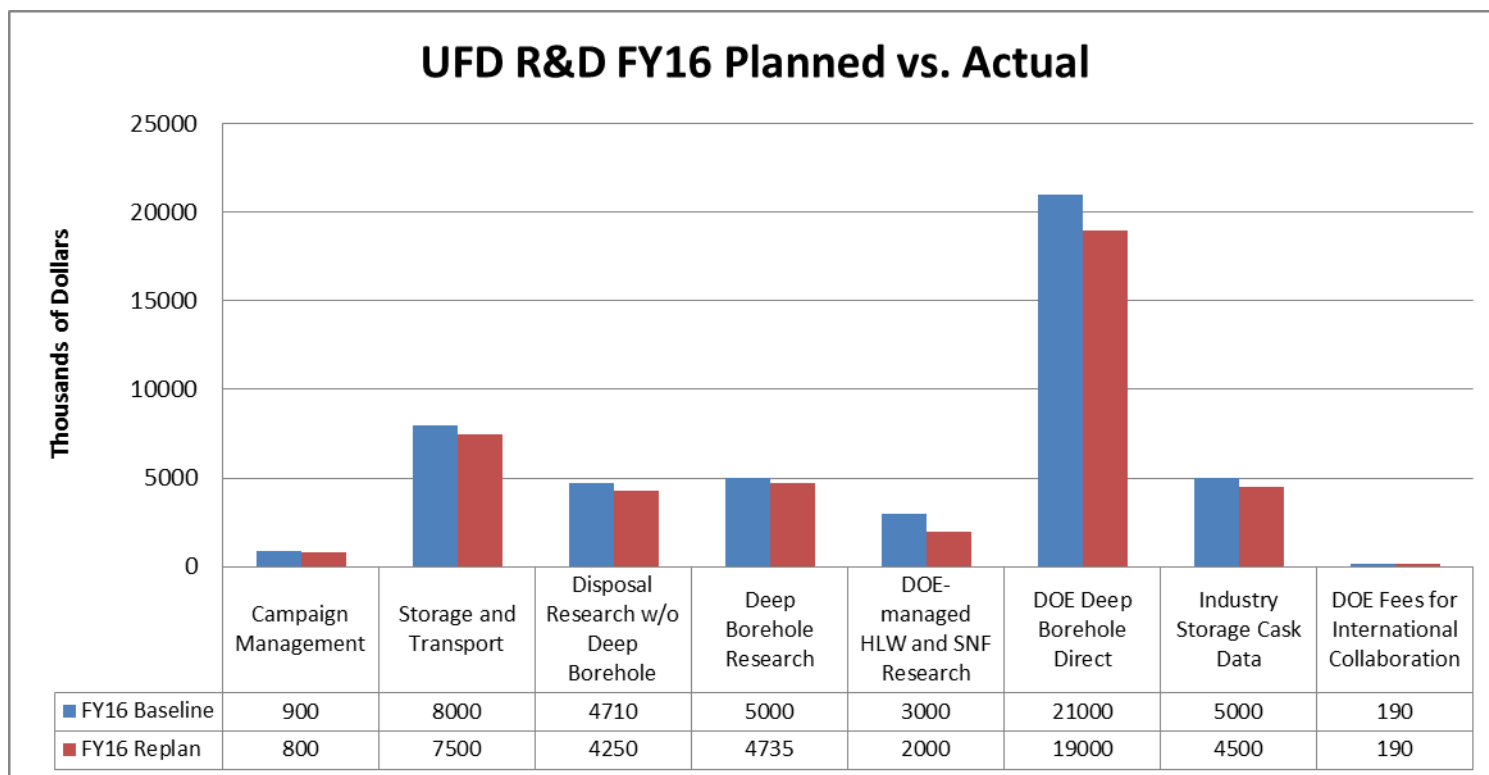
UFD R&D Funding 2010-2016

- FY09: UFD R&D Planning meeting at ANL June 2009
- FY11: Storage and Transportation R&D added
- FY12: Temporary funding increase
- FY13: Formation of NFST
- FY14-FY16: increasing importance of industry contracts for large-scale R&D projects
 - High-Burnup Data Project
 - Deep Borehole Field Test

*Approximate total funding for UFD R&D
(including DOE-managed HLW and SNF R&D in FY16)*



***FY16 Omnibus Appropriation Bill cut the UFD R&D budget by ~\$4.8M
(includes the DOE-managed HLW and SNF R&D Program)
Cuts implemented in February 2016, mid-2Qtr***



Used Fuel Disposition

Used Fuel Disposition Cost Performance (\$k) (February 2016 data)

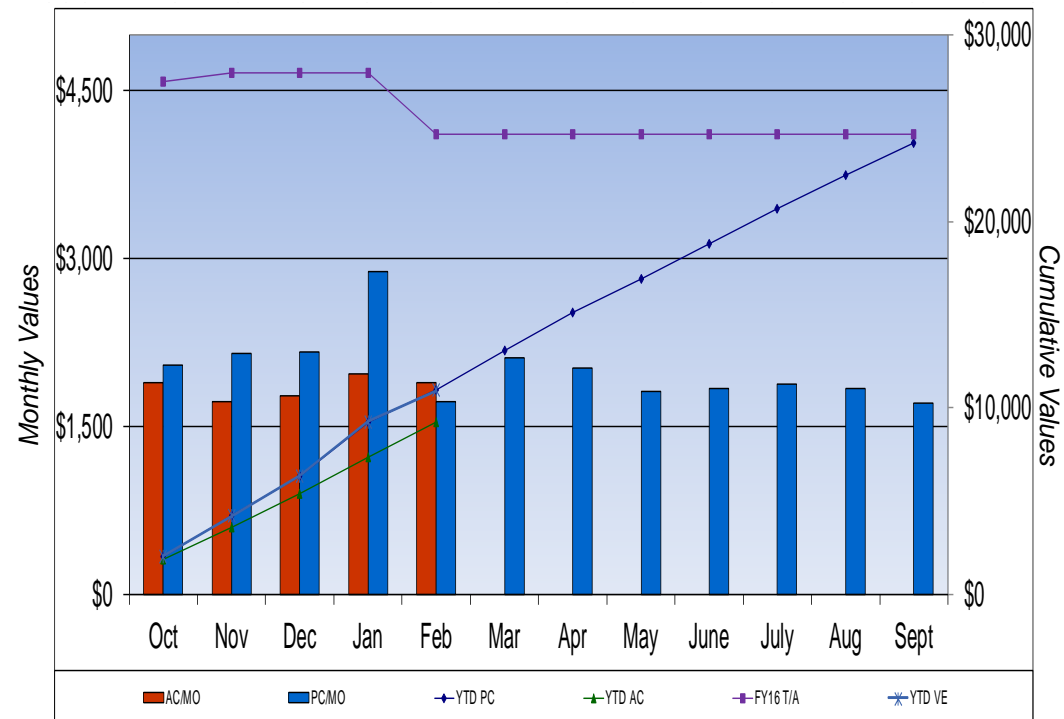
WBS	Title	Total Available	MONTHLY					CUMULATIVE					CHANGE (%)
			PC	VE	AC	Var (VE-AC)	Var (%)	PC	VE	AC	Var (VE-AC)	Var (%)	From Prior Month
1.02.08	UFD - PMB	24,657	1,723	1,692	1,894	(202)	-11.94%	10,973	10,940	9,255	1,685	15.40%	↑ 5.00%
1.02.08	UFD - Non PMB	23,690	0	0	0			0	0	0			

➤ Cost Variation

The cost underrun variation November through January is due to cautious spending associated with appropriation uncertainty; subsequent events have demonstrated that the cautious approach was justified. The February results have improved the underrun from the previous month (20.4% in January vs. 25.4% in February), and we expect to see continued improvements to the underrun as projects are fully funded (with respect to omnibus allocations) sometime in April.

➤ Open Commitments - \$664K

Open commitments have changed little (up slightly from \$625k in January), consistent with invoicing of contractor costs.



PC = Planned Cost; AC = Actual Cost; VE = Value Earned; TA = Total Available (FY16 Allotments plus PY Carryover)

Used Fuel Disposition R&D Campaign

FY17 Planning

Schedule for FY17 Planning

- **June 2016: Campaign management works with NE-53 to prepare FY17 plan at the control account level**
- **June 28-29, 2016: NE-5 Budget Planning Review**
- **July-September 2016: Preparation of final FY17 planning packages**

Used Fuel Disposition

Comparing the President's FY17 Budget Request with the House and Senate Bills

	FY 2015	FY 2016	FY 2017					
	Current	Enacted	Request	House Subcommittee (4/13/16)	Delta		SAC (4/14/16)	Delta
Used Nuclear Fuel Disposition	70,224	85,000						
UNFD R&D	[47,724]	[62,500]	74,338	61,128	(13,210)	D/		(74,338) d/
Integrated Waste Management System	[22,500]	[22,500]	76,300	0	(76,300)	E/	61,050	(15,250)
Unallocated	0	0	0	8,000	8,000		89,290	89,290
Fuel Cycle R&D	191,242	203,800	249,938	177,228	(72,710)		219,730	(30,208)

HOUSE NOTES

D/ \$6M for rail cars, \$12M for high burnup fuel
E/ Hard Zero

SENATE NOTES

d/ includes 14.25M for long term storage R&D (?)

050 - Defense Function Funding within Request

Dollars in Thousands

	FY 2015	FY 2016	FY 2017					
	Current	Enacted	Request	House Subcommittee (4/13/16)	Delta		SAC (4/14/16)	Delta
050 Funding								
Fuel Cycle R&D - UNFD - IWMS	4,500	-	15,260	0	(15,260)		0	(15,260)

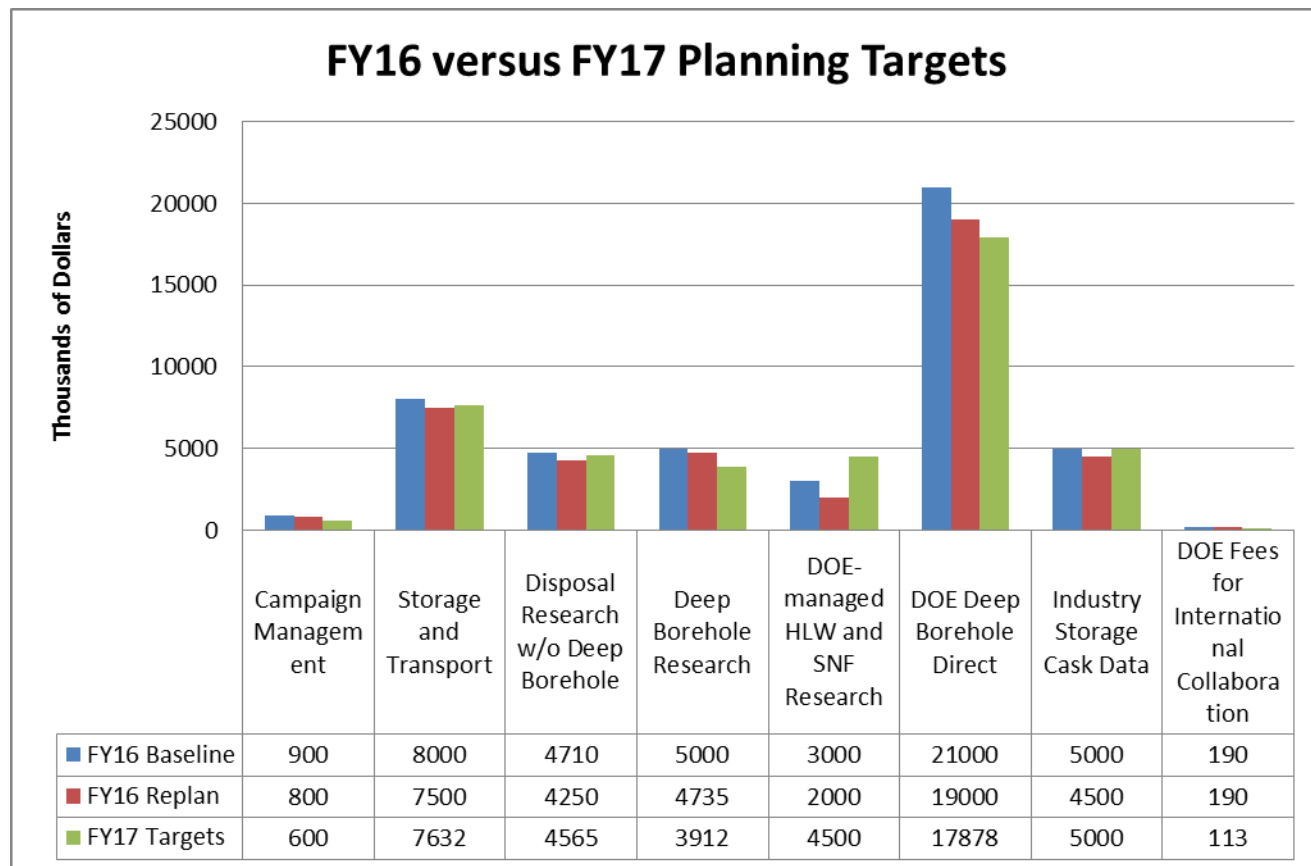
All amounts are "Pre-tax": historically, approx. 20% of the NE R&D budget has gone to University programs and 10% to other HQ programs

FY17 Planning Targets

■ NE-5 Planning guidance for FY17

- Total for UFD R&D including industry contracts is \$39.7M
- Total for DOE-Managed HLW/SNF R&D is \$4.5M

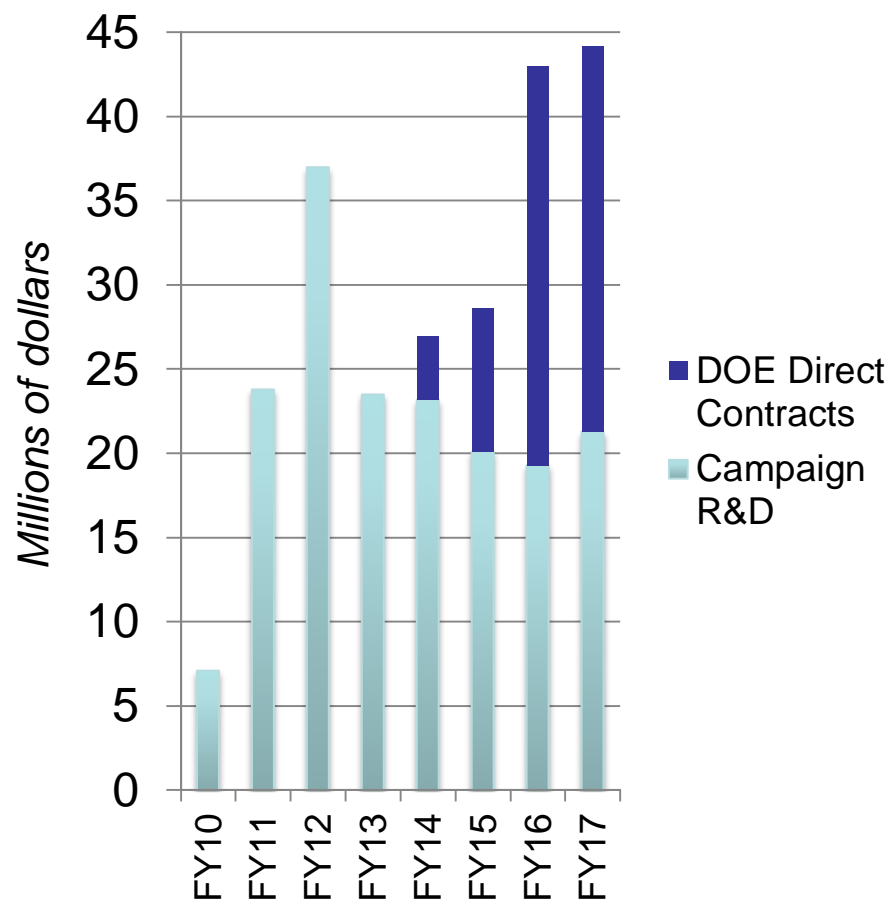
■ Guidance at the work package level will come from control account managers



UFD R&D Funding 2010-2017

- FY09: UFD R&D Planning meeting at ANL June 2009
- FY11: Storage and Transportation R&D added
- FY12: Temporary funding increase
- FY13: Formation of NFST
- FY14-FY16: increasing importance of industry contracts for large-scale R&D projects
 - High-Burnup Data Project
 - Deep Borehole Field Test
- FY17 (proposed)
 - includes \$4.5M for DOE HLW/SNF

*Approximate total funding for UFD R&D
(including DOE-managed HLW and SNF R&D in FY16 and FY17)*



- **A continuing resolution seems likely until after the November election**
 - Plan carryover accordingly
- **FY17 funding will be determined by Congressional appropriation**
- **Stay flexible**

**Used
Fuel
Disposition**

Questions and Discussion?