SAND2012-4452P

Used Fuel Disposition Campaign

Used Fuel Disposition Campaign Working Group Meeting

Peter Swift

National Technical Director

Used Fuel Disposition Campaign

Las Vegas, Nevada

May 15, 2012

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.

Used Fuel Disposition Campaign

Used Fuel Disposition Campaign Working Group Meeting

Meeting Objectives and Approach

Peter Swift
National Technical Director
Used Fuel Disposition Campaign

Las Vegas, Nevada
May 15, 2012

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 FY12, plans for FY13, expectations regarding multiyear planning*
  - Communication among multiple campaigns and crosscutting activities
    - *Used Fuel Disposition, Waste Form, Systems, QA*
  - Communication among researchers with common interests
    - *The heart of a working group meeting*

Meeting Approach

- **Comments on previous meetings**
  - The July 2011 format was an improvement over previous years
  - Limit plenary sessions to information needed by all
  - Provide opportunities for focused technical discussions
- **The plan**
  - Full-group presentations on the first and last days only
    - *Opportunity for campaign management to provide basic information and strategy*
    - *Opportunity for questions and discussion; all topics are welcome*
  - Topical break-out sessions Tuesday afternoon and Wednesday
    - *In depth discussions*
    - *Space is available for impromptu meetings: contact campaign management for help in getting the word out*
  - Reconvene as a full group for Thursday morning session
    - *Updates from Waste Form and Systems Campaigns*
    - *Updates from the Storage/Transportation and Disposal Leads*
    - *Closing comments*

Used Fuel Disposition Campaign

Used Fuel Disposition Campaign Working Group Meeting

Summary of UFD Campaign

Peter Swift
National Technical Director
Used Fuel Disposition Campaign

Las Vegas, Nevada
May 15, 2012

Outline of Presentation

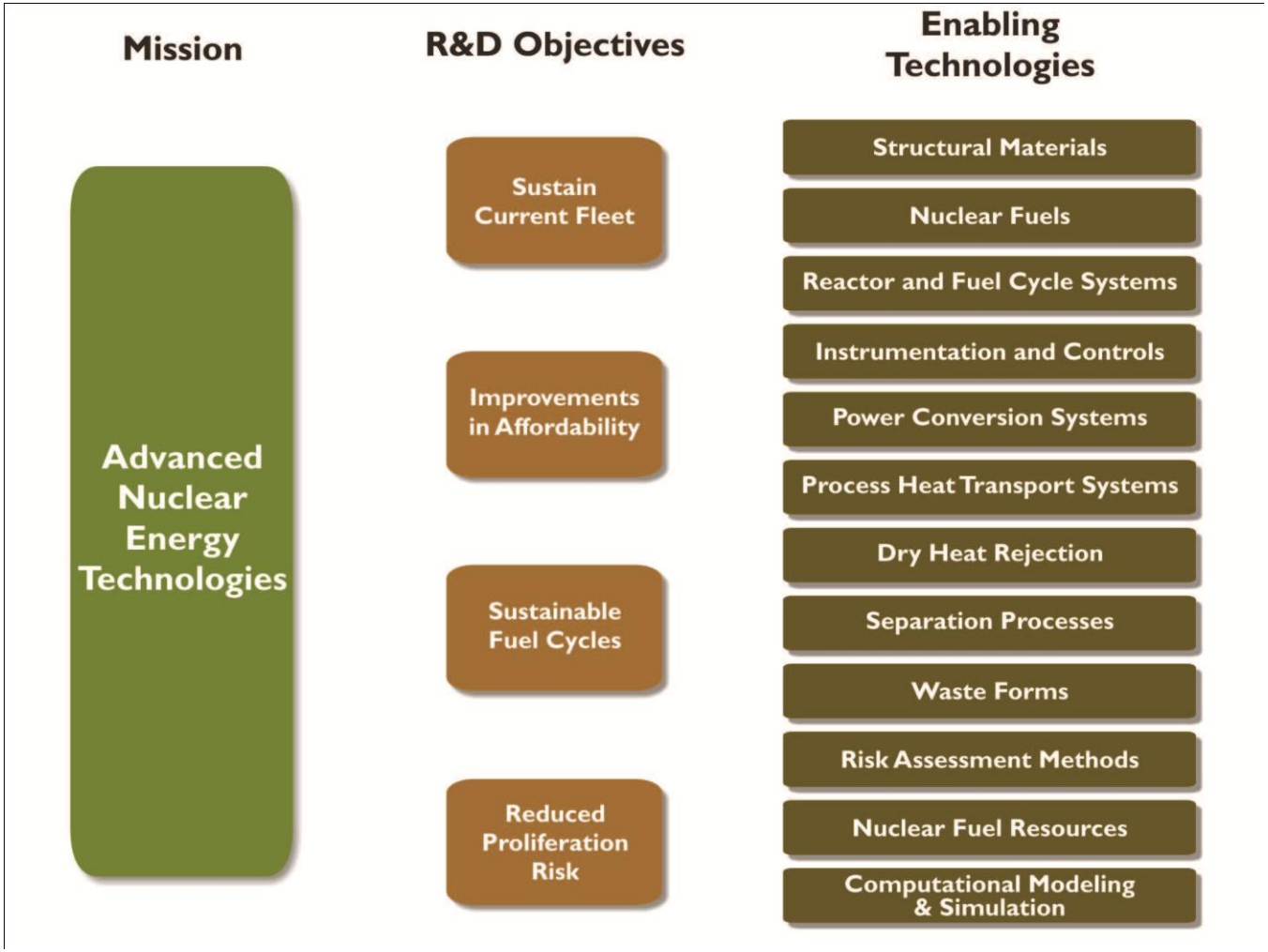
- **Overview of DOE Office of Nuclear Energy and Fuel Cycle Technologies R&D**
  - Where the Used Fuel Disposition Campaign fits in the larger mission
- **Current Status of the UFD campaign**
  - FY12 planning basis
  - External factors
    - *FY12 Appropriations*
    - *Blue Ribbon Commission Recommendations*
    - *Current revised baseline for FY12*
- **FY12 Highlights to date**
  - Review of the PICSNE reporting process, and a reminder to Work Package Managers: what you enter in PICS matters

DOE Office of Nuclear Energy Mission Statement

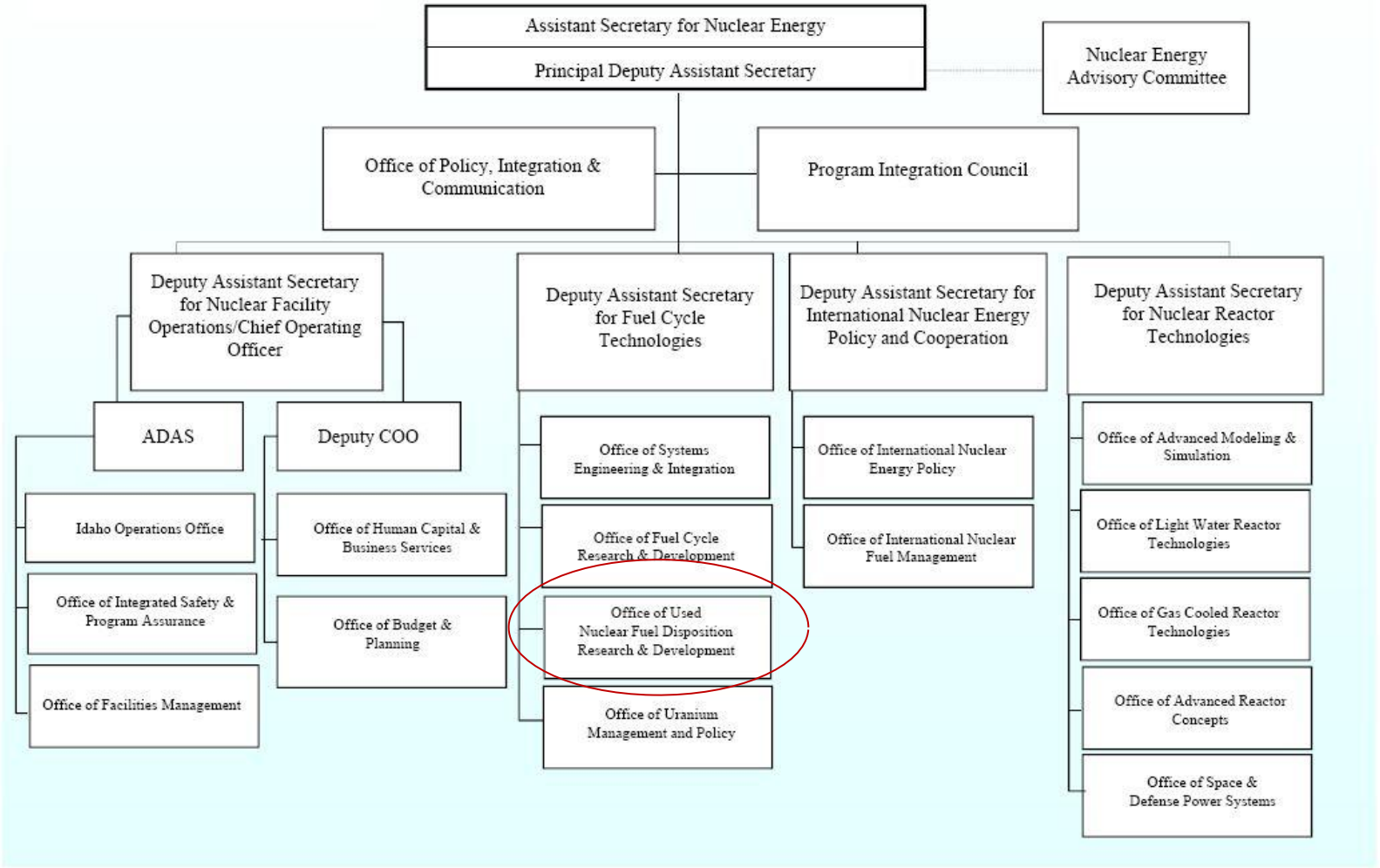
- **The primary mission of the Office of Nuclear Energy is to advance nuclear power as a resource capable of meeting the Nation's energy, environmental, and national security needs by resolving technical, cost, safety, proliferation resistance, and security barriers through research, development, and demonstration as appropriate.**
  - In addition to its primary mission, the Office of Nuclear Energy performs several mission-related functions including providing:
  - International engagement in support of the safe, secure, and peaceful use of nuclear energy as well as support to other Department offices and other federal agencies on issues related to the international use of civilian nuclear energy
  - The capability to develop and furnish nuclear power systems for use in national security and space exploration missions
  - Oversight for specifically assigned front-end fuel cycle responsibilities
  - Stewardship of the DOE Idaho Site

Source: http://www.ne.doe.gov/neMission.html

DOE-NE Mission and Objectives
(from the 2010 DOE-NE Roadmap Report to Congress)



DOE-NE Organization Chart



Fuel Cycle Technologies Program Mission and Objectives

- **The mission of the Fuel Cycle Technologies program is to:**
  - Develop used nuclear fuel management strategies and technologies to support meeting federal government responsibility to manage and dispose of the nation's commercial used nuclear fuel and high-level waste; develop sustainable fuel cycle technologies and options that improve resource utilization and energy generation, reduce waste generation, enhance safety, and limit proliferation risk.

- **Program Objectives**
  - In the near term,
    - *Address Blue Ribbon Commission on America's Nuclear Future recommendations*
    - *Develop a strengthened technical and scientific basis for extended UNF storage*
    - *Partner with industry to develop and demonstrate integrated solutions for storage of used nuclear fuel*
    - *Identify and test options to increase accident tolerance of the light water reactor fleet*
    - *Select the preferred sustainable fuel cycle options for further development*
    - *Support the deployment of advanced enrichment technology to meet national energy and security objectives*

Source: Fuel Cycle Technologies Program Mission and Objectives, February 2012.

Fuel Cycle Technologies Program Mission and Objectives (cont.)

- **Program Objectives (cont.)**
  - In the medium term,
    - *Conduct science-based, engineering-driven research for sustainable fuel cycle options*
    - *Partner with industry to deploy an integrated solution for the extended storage of used nuclear fuel*
    - *Develop the scientific basis for multiple disposal options for used nuclear fuel and high-level waste*
    - *Demonstrate and deploy technical and process enhancements that enhance the accident tolerance of the current reactor fleet*
  - By mid-century,
    - *Have implemented acceptable and safe options, strategies and solutions for management (including extended storage and long-term disposal) of used nuclear fuel and nuclear waste*
    - *Support affordable, safe, and secure nuclear-generated electricity by deploying advanced nuclear systems and facilities*
    - *Test and make available advanced technologies that enable sustainable fuel cycles*

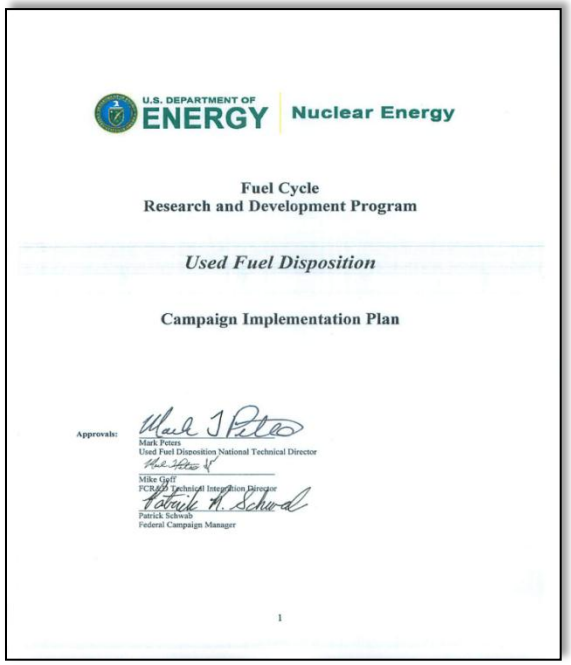
Source: Fuel Cycle Technologies Program Mission and Objectives, February 2012.

UFD Mission

The MISSION of the Used Fuel Disposition Campaign is 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.

Used Fuel Disposition Campaign
Implementation Plan
M1508010102, March 29, 2010

Proposed for update Sept. 28, 2012


U.S. DEPARTMENT OF ENERGY | Nuclear Energy

Fuel Cycle
Research and Development Program

Used Fuel Disposition

Campaign Implementation Plan

Approvals:

Mark Peters
Used Fuel Disposition National Technical Director

Mike Goff
FCR&D Technical Integration Director

Patrick Schwab
Federal Campaign Manager

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UFD Campaign 2009-Present

HISTORY OF THE CAMPAIGN

- FY09 Planning meeting at Argonne National Laboratory, June 2009
- FY10 R&D funding at $7.1 M
  - Disposal R&D, modest level of effort on Storage R&D, no Transportation R&D
- FY11 R&D funding at $23.8 M
  - Nine national laboratories participating in UFD
  - Significant R&D program in Storage, including Transportation
  - Expanded Generic Disposal R&D activities
- FY12 R&D budget $36.0 M (as of May 1, including pending BCPs)
  - Some elements of FY12 work scope still uncertain. Programmatic uncertainties remain regarding national policy and Yucca Mountain litigation.

UFD Strategic Goals

Storage and Transportation: Strategic Goals from the March 2010 UFD Campaign Implementation Plan

- Near Term (2010-2015)
  - *Develop a storage roadmap that provides a systems perspective of alternatives that address safety, security, and flexibility to accommodate the evolution of disposal options*
  - *Develop a plan for a demonstration storage facility*
  - *Develop recommendations for advanced analytical approaches that can be applied to safety and security scenarios for storage*
  - *Identify and develop criteria for verification of fuel integrity prior to shipment after long-term storage.*
  - *Develop a technical basis for licensing transportation systems designed to ship high burnup fuels*

- Long-Term (2010-2022)
  - *Field an NRC-licensed storage facility to demonstrate long-term storage capability that addresses strategic goals*
  - *Develop advanced analytical approaches for evaluating storage options based on the five-year recommendations*
  - *Working with DOE and industry, develop a plan to field a commercial-scale long-term interim storage facility*
  - *Complete the technical basis for licensing transportation systems designed to ship high burnup fuels*

UFD Strategic Goals

Disposal Research Strategic Goals from the March 2010 UFD Campaign Implementation Plan

- Near Term (2010-2015)
  - *Develop a framework of computational models, validated by experiments, for evaluating disposal system performance*
  - *Develop a catalog of potential disposal systems that could be utilized*
  - *Demonstrate capability for analysis of various disposal concepts, and to use this capability to analyze the fuel cycle system options evaluated by the NE program*
  - *Perform preliminary model analyses for various design concepts and disposal environments and support total system performance assessments for generic disposal system studies*

- Long-Term (2010-2022)
  - *Development of the modeling capability for evaluating and demonstrating disposal system performance, validated by experiment.*
  - *Experimental programs to fill data needs and validate advanced modeling approaches*
  - *Robust modeling and experimental basis for evaluation of multiple disposal system options*
  - *Develop the necessary system architecture and computational environment to support the evaluation of post-closure risk*
  - *Develop a functional assessment framework tool available to support the generic disposal system modeling activities*

External Factors: Congressional Appropriations

- **Language from the House Conference Report 112-331 accompanying the Consolidated Appropriations Act, 2012**

Fuel Cycle Research and Development.—The conference agreement provides $187,351,000.

The conference agreement includes $60,000,000 for Used Nuclear Fuel Disposition. Within available funds, $10,000,000 is for development and licensing of standardized transportation, aging, and disposition canisters and casks. Multiple geologic repositories will ultimately be required for the long-term disposition of the nation's spent fuel and nuclear waste; the Department should build upon its current knowledge base to fully understand all repository media and storage options and their comparative advantages, and the conferees direct the Department to focus, within available funds, $3,000,000 on development of models for potential partnerships to manage spent nuclear fuel and high level waste, and $7,000,000 on characterization of potential geologic repository media. The Department is directed to preserve all documentation relating to Yucca Mountain, including technical information, records, and other documents, as well as scientific data and physical materials.

The conference agreement includes $10,000,000 to expand the Department's capabilities for assessing issues related to the aging and safety of storing spent nuclear fuel, to include experimentation, modeling, and simulation for dry storage casks, as well as for spent fuel pools, as necessary.

(http://www.gpo.gov/fdsys/pkg/CRPT-112hrpt331/content-detail.html)

The Blue Ribbon Commission

- **Recommendations from the BRC's Report to the Secretary of Energy, January 2012 (http://brc.gov/)**
  - A new, consent-based approach to siting future nuclear waste management facilities.
  - A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed.
  - Access to the funds nuclear utility ratepayers are providing for the purpose of nuclear waste management.
  - Prompt efforts to develop one or more geologic disposal facilities.
  - Prompt efforts to develop one or more consolidated storage facilities.
  - Prompt efforts to prepare for the eventual large-scale transport of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities when such facilities become available.
  - Support for continued U.S. innovation in nuclear energy technology and for workforce development.
  - Active U.S. leadership in international efforts to address safety, waste management, non-proliferation, and security concerns.

- **The DOE's Response to the BRC**
  - Secretary Steven Chu, February 15, 2012
    - *"Today, I am announcing an internal working group to assess the Blue Ribbon Commission recommendations and develop a strategy that builds on its excellent work."*

      (http://energy.gov/articles/secretary-chus-remarks-vogtle-nuclear-power-plant-prepared-delivery)
  - Congress has requested DOE's strategy for addressing BRC recommendations within 6 months of the release of the BRC's report

Used Fuel Disposition

Used Fuel Disposition Issues and Concerns

(Include any anticipated baseline changes)

- *FY12 budget/funding are resulting in additional planning and prioritization of activities*
- *Response to Blue Ribbon Commission for America's Nuclear Future could affect UFD activities and priorities*
- *Baseline Changes*
  - *BCP-FT-2012-18: New initiative for standardized canister development; $500K [Complete 2/15/12]*
  - *BCP-FT-2012-19: Develop a research, development, and demonstration plan for deep borehole disposal of nuclear waste will be developed that will identify key technical uncertainties, engineering gaps, and the organizational structure for a borehole demonstration ; $400K [Complete 3/1/12]*
  - *BCP-FT-2012-21: Increased support the UFD System Architecture Study and develop a status of stranded fuel at decommissioned U.S. reactors; 400K [Complete 2/28/12]*
  - *BCP-FT-2012-31: In support of DOE's Management and Disposition Task Force responding to BRC recommendations, SRNL is to updating the Generic Salt Repository for Disposal of Waste from a Spent Nuclear Fuel Recycle Facility (2011 Generic Study) to evaluate the disposal of DOE high-level waste and spent nuclear fuel in a salt repository; $200K [Complete 3/21/12]*
  - *BCP-FT-2012-32: Continue work on a multi-year experimental program investigating mechanical, hydrological, and chemical behavior of salt at elevated temperatures consistent with disposal of used nuclear fuel and high-level radioactive waste; $4,410 K [pending]*
  - *BCP-FT-2012-33: Provides scope and budget provided by increase in appropriation funding in support of UFD Canister Inspection. The general objective is to obtain in situ data from the surfaces of stainless steel dry storage canisters to identify conditions under which SS canister corrosion and SCC could occur; $500K [Complete 2/28/12]*
  - *BCP-FT-2012-34: Provides funding from the appropriation increase for UFD to continue to address the recommendations from the BRC; $20K [Complete 3/22/12]*
  - *BCP-FT-2012-41: Standardized Canister Scope Expansion; $480K [pending]*
  - *BCP-FT-2012-42: UFD Degradation Mechanisms; $500K [pending]*
  - *BCP-FT-2012-42: UFD Siting Database; $500K [pending]*
  - *BCP-FT-2012-44: UNF Assessment Capabilities; $5,860K [pending]*

Used Fuel Disposition

FY12 UFD Campaign Structure
(approved baseline as of November 16, 2011)

Management Group	R&D Activities
Crosscut activities (3095 k)	Campaign Management and Integration International Perspectives on Nuclear Waste Management
Disposal Research (11,440 k)	Generic EBS Evaluation Generic Natural Systems Evaluation Generic Disposal System-Level Modeling Thermal Load Management and Design Concepts Inventory LLW Disposition
Storage and Transportation Research (8250 k)	Test and Evaluation Capability Development Storage R&D Investigations Transportation Security Engineering Analysis Engineered Materials -- Experimental

Campaign Total as of 11/16/11
15 Control Accounts
$22.8M

Used Fuel Disposition

FY12 UFD Campaign Structure
(as of May 1, 2012)

Management Group	R&D Activities
Crosscut activities (5077k)	Campaign Management and Integration International Perspectives on Nuclear Waste Management Standardized Canisters Stranded Fuel Siting Database
Disposal Research (16,040 k)	Generic EBS Evaluation (includes Salt Disposal Investigations) Generic Natural Systems Evaluation Generic Disposal System-Level Modeling Salt R&D Thermal Load Management and Design Concepts Deep Borehole Disposal Inventory LLW Disposition
Storage and Transportation Research (14,910 k)	Field Testing Storage R&D Investigations Transportation Engineering Analysis Engineered Materials – Experimental UNF Assessment Capabilities Security (transition to MPACT)

Campaign Total as of 05/01/12 21 Control Accounts $36M

UFD: FY12 Highlights
(from the April 5 Fuel Cycle Technologies NTD Review)

- **Cross-cutting Activities**
  - International
    - *Expansion of ongoing collaboration with ROK*
    - *Initiation of new international collaborations in disposal research*
      - Partnership in the Mont Terri (Switzerland) Underground Research Laboratory in clay (11/24/2011)
      - Participation in DECOVALEX (Development of Coupled Models and their Validation Against Experiments in Nuclear Waste Isolation)
      - Participation in colloid transport experiments in the Grimsel granite URL in Switzerland
  - "Perspectives in Nuclear Waste Management": Significant redirection to existing work and new work in progress
    - *Analysis of the interface between storage, transportation, and disposal*
      - System architecture studies
      - Standardized canisters
      - Direct disposal options for Dual Purpose (Storage and Transportation) Canisters (DPCs)
      - Stranded used nuclear fuel
    - *Support for Blue Ribbon Commission Response team*
      - Transportation
      - Siting

UFD: FY12 Highlights (cont.)

(from the April 5 Fuel Cycle Technologies NTD Review)

- **Storage and Transportation**
  - Completion of phase 1 of cladding ring compression tests (12/31/2011)
  - Completion of the Storage and Transportation Roadmap (3/27/2011)
  - Clad testing to begin at HFIR April 2012
  - Technical review of High and Medium Priority R&D gaps (due 4/30/2012)
  - Extensive interactions with industry, NRC, leadership role in EPRI/ESCP (Extended Storage Collaboration Program)

- **Disposal Research**
  - Evaluation of Generic Engineered Barrier System (EBS) Design Concepts (due 6/16/2012)
  - Modeling of coupled processes in clay near field environment (due 8/15/2012)
  - Integration of EBS models with Generic Disposal System Models (due 9/7/2012)
  - Coupled Thermal-Hydrological-Mechanical Processes in Salt (due 11/15/2012)
  - Update to Thermal Load Management Analyses (due 11/15/2012)
  - Generic Safety Case for Geologic Disposal of Nuclear Waste (due 6/30/2012)
  - Salt R&D Study Plan (delivered 3/23/2012)
  - Deep Borehole Disposal RD&D Roadmap (due 8/31/2012)

Used Fuel Disposition

Example slides from the Fuel Cycle Technologies Monthly Campaign Performance Review

Reproduced from the April 5 and 26, 2012 reviews of the February and March 2012 data

Reproduced from the April 26 2012 FCT Performance Review of the March 2012 data

Used Fuel Disposition Milestone Status – M2's

Milestone Number	Title	Level	Estimated Finish Date	Revised Finish Date	Actual Finish Date	$ Impact	QRL
1.02.08.01 - CX Campaign Management							
M2FT-12SN0801021	Update of the UFD Campaign Implementation Plan	M2	9/28/2012			-	N/A
1.02.08.02 - ST T&E Capability Development							
M2FT-12IN0802021	Identify and Assess NRC RAI's Against the Technical Data Gap Report	M2	12/31/2011		12/31/2011	-	QRL3
M2FT-12SN0802061	Test plan for gathering on-site atmospheric data, including coastal data, and for conducting stainless steel canister corrosion tests.	M2	6/30/2012			-	QRL3
1.02.08.03 - ST R&D Investigations							
M2FT-12PN0803041	High and Medium Technical Gap Priorities Report	M2	4/30/2012			-	QRL2
M2FT-12AN0803011	Aging Management Plans for Existing Dry Cask Storage Designs Report:	M2	6/30/2012			-	QRL3
M2FT-12PN0803042	Review of Technical Data Gaps Relative to Similar External Studies	M2	7/31/2012			-	QRL3
1.02.08.04 - DR Thermal Load Management & Design Concepts							
M2FT-12SN0804031	Refine Repository Design Concepts and Thermal Analysis	M2	11/15/2012			-	QRL2
1.02.08.05 - ST Engineered Materials Experimental							
M2FT-12AN0805082	Complete Phase I of fuel clad ring compression tests	M2	12/31/2011		12/31/2011	-	QRL2
M2FT-12OR0805041	Initiate clad testing at HFIR:	M2	3/31/2012		3/30/2012	-	QRL2
1.02.08.06 - DR Generic EBS Evaluations							
M2FT-12SN0806061	Report on the Evaluation of Generic EBS Design Concepts and Process Models: Implications to EBS Design Optimization	M2	6/16/2012			-	QRL3
M2FT-12SN0806062	Integration of EBS Models with Generic Disposal System Models.	M2	9/7/2012			-	QRL3
M2FT-12SN0806081	Coupled Thermal-Hydrological-Mechanical Processes in Salt	M2	11/15/2012			-	QRL3
1.02.08.07 - DR Generic Natural System Evaluations							
M2FT-12LL0807071	Report on Radionuclide interaction and transport in representative geologic environments	M2	6/20/2012			-	QRL3
M2FT-12LB0807061	Report on Modeling coupled processes in the near field of a clay repository	M2	8/15/2012			-	QRL3
M2FT-12SN0807081	Report on Integrated tool development for natural system evaluation	M2	9/1/2012			-	QRL3
M2FT-12LA0807051	Report on Fluid flow model development for representative geologic media	M2	12/15/2012			-	QRL3

Reproduced from the April 26 2012 FCT Performance Review of the March 2012 data

Used Fuel Disposition Milestone Status – M2's (cont.)

Milestone Number	Title	Level	Estimated Finish Date	Revised Finish Date	Actual Finish Date	$ Impact	QRL
1.02.08.08 - DR Generic Disposal System Level Modeling							
M2FT-12SN0808041	A Safety Case for the Generic Disposal of Nuclear Waste.	M2	6/30/2012			-	QRL2
M2FT-12SN0808042	Generic Disposal System Model: Architecture, Implementation, and Demonstration.	M2	11/15/2012			-	QRL2
1.02.08.09 - DR Inventory							
M2FT-12SR0809051	Complete Revision 5 of the Inventory Estimate Report	M2	7/31/2012			-	QRL3
1.02.08.11 - CX International							
M2FT-12LB0811021	Report on UFD Campaign International Activities in Disposal Research	M2	9/15/2012			-	QRL3
1.02.08.13 - ST Transportation							
M2FT-12OR0813031	Criticality analysis and mitigations for degraded UNF in storage canisters report	M2	9/1/2012			-	QRL3
M2FT-12SN0813052	Compilation of Transportation Issues and Resolutions	M2	9/30/2012			-	QRL3
1.02.08.14 - CX Perspectives on NW Management							
M2FT-12SN0814052	Report describing Advanced Nuclear Fuel Cycle Effects on the Treatment of Uncertainty in the Long-Term Assessment of Geologic Disposal Systems	M2	3/30/2012	5/15/2012		(25,000)	QRL2
M2FT-12AN0814013	Revision to the UFDC Disposal R&D Roadmap Report	M2	9/28/2012			-	QRL2
M2FT-12SN0814051	Report documenting analysis of Public and State Preferences Related to Siting, Characterization, and Operation of Radioactive Waste Management Facilities for Storage and Disposal	M2	9/28/2012			-	QRL3
M2FT-12SN0814057	Status of Stranded Used Nuclear Fuel	M2	10/31/2012			-	QRL3
M2FT-12AN0814012	Report describing Waste Management Integration - Interfaces Between Long-Term Storage and Permanent Disposal	M2	10/31/2012			(7,500)	QRL3
1.02.08.17 - Deep Bore Hole							
M2FT-12SN0817031	Deep Borehole Disposal Research, Development, and Demonstration Roadmap	M2	8/31/2012			-	QRL3

New Altered Level 2 Milestones for this months reporting (highlighted yellow above):

- ***M2FT-12SN0814052:*** *Report as completed did not meet the desires of CAM and Deputy NTD (Mark Nutt) to include description of the process of characterizing uncertainty. Effort underway to revise the draft and submit for peer review. Anticipated finish date 5/15/2012.*

Used Fuel Disposition

Reproduced from the April 5 2012 FCT Performance Review of the February 2012 data

Used Fuel Disposition Cost Performance ($Ks)

			MONTHLY					CUMULATIVE					CHANGE (%)
WBS	Title	Total Available	PC	VE	AC	Var (VE-AC)	Var (%)	PC	VE	AC	Var (VE-AC)	Var (%)	From Prior Month
1.02.08	UFD	32,666	2,386	2,372	2,431	(59)	-2.49%	11,194	11,147	10,234	912	8.18%	2.88%

- ***Cost Variation: Within Threshold***

  The 8%, $912K cumulative, cost under-run is a decrease from January. Primary control accounts leading to the cost variation are:

  1.02.08.02, ST T&E Capability Development ($190K): the effort in this control account was re-scoped and activities were paused. Activities resumed and variance decreasing.

  1.02.08.03, ST R&D Investigations ($179K): Primary work packages supporting development of Storage R&D plan.

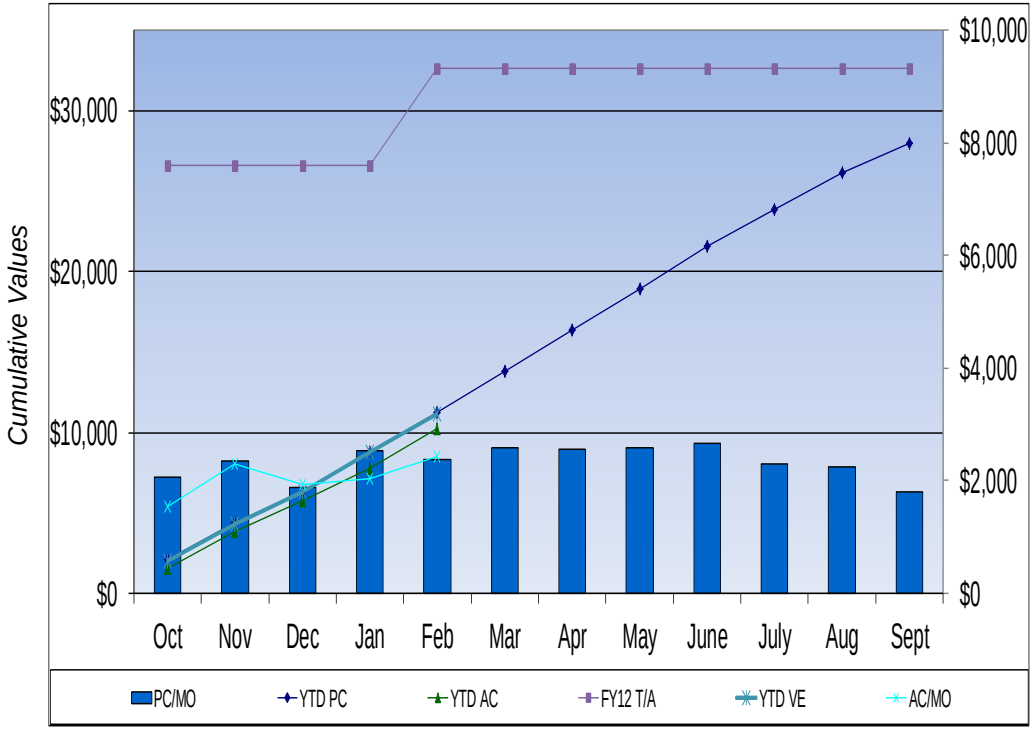
  1.02.08.07, DR Generic Natural System Evaluations ($297K): Primarily a staffing resource issue. Staff is being re-allocated, and in some cases hired, to address variance. Delays in sub-contract invoicing.

  1.02.08.09, DR Inventory ($257K): Variance will decrease as support to FCO campaign began following integration meetings held in February.

  1.02.08.13, ST Transportation ($210K): 200K was transferred into this account for development of the storage RD&D plan being lead by INL. The costs for that effort were billed to another work package and those costs will be transferred into this work package.

- ***Open Commitments - $1,070K***

  Complex Systems LLC (T. Cotton, M. Voegele, C. Fairhurst)
  University of Oklahoma (H. Jenkins-Smith)



PC = Planned Cost; AC = Actual Cost; VE – Value Earned; TA = Total Available (FY12 Allotments plus FY11 Carryover)

Reproduced from the April 5 2012 FCT Performance Review of the February 2012 data

Used Fuel Disposition Major Accomplishments

Storage and Transportation R&D Investigations

[PNNL] Rev. 0 of the Gap Analysis to Support Extended Storage of Used Nuclear Fuel was officially released on January 31, 2012 after addressing industry comments on the draft report.

[INL] Presented an overview of drying issues identified in the development of the Annotated Bibliography for Drying Nuclear Fuel (INL/EXT-11-23561) at a Workshop on Extended Dry Storage of Used Nuclear Fuel held February 2-3, in Atlanta, Georgia, in conjunction with the ASTM International meeting of Committee C26 on Nuclear Fuel Cycle and Subcommittee C26.13 on Spent Fuel and High Level Waste.

[PNNL] Brady Hanson hosted an ASTM-sponsored workshop on drying of used nuclear fuel at the ASTM meeting in Atlanta. Good discussions were held and information from cask vendors and industry experts with drying experience was shared. It is clear that the technical basis behind the current drying procedures is weak, but that is not to imply that there is a bigger problem with residual moisture.

[SRNL] Personnel from SRNL participated in the ASTM C26.13 Workshop on Extended Storage of Used Nuclear Fuel, and presented work on radiolytic H_2 generation from metal oxyhydroxides. R. Sindelar is serving as the Task Chair lead for a revision to the ASTM drying standard C1553-08.

Engineered Materials Experimental

[PNNL] Agreements with clad vendors were formulated to determine the best legal method to handle any commercially sensitive data which may be generated during the program. This agreement has required an extension of the bid due dates for the clad tubes. At this time agreements have been reached and bids will be received from at least three clad vendors and will cover all of the 5 most common commercially used fuel clad alloys.

[PNNL] Hydrogen pre-charge of Zr-4 was continued and gas analysis was used to determine the hydrogen content. Microscopy work on neutron poison materials subjected to humid air corrosion in support of M4FT-12PN0805052 was performed and demonstrated visible corrosion over the ~4 month test conducted at PNNL by a University of Michigan graduate student.

Reproduced from the April 5 2012 FCT Performance Review of the February 2012 data

Used Fuel Disposition Major Accomplishments

Generic Natural System and Engineered Barrier System Modeling

[ANL] Implemented mixed potential model for UO_2 dissolution into MATLAB for use as base platform for module to account for effects of competing oxidation reactions catalyzed by noble metal particles (NMP). The model will be developed and parameterized by comparison to electrochemical experiments using combinations of alloy and UO_2 electrodes with various solution concentrations of dissolved H_2O_2, H_2, and additives that could affect the catalytic activity of the NMP.

[ANL] Developed initial matrix of electrochemical experiments for FY2012. Tests will focus on (1) demonstrating experimental approach, (2) characterizing UO_2 dissolution behavior in H_2O_2/H_2 solutions in the presence and absence of NMP, (3) quantifying effect of $[H_2O_2]$ on UO_2 dissolution rate in presence of NMP, (4) characterizing corrosion behavior of NMP, and (5) measuring effects of corrosion on catalytic activity of NMP.

[PNNL] Sintered ceramic UO_2 was re-pressed and sintered producing a quality simFuel product and continuing development of additional compositions of simFuels.

[PNNL] Radiolysis model has been simplified to 40 equations compared to the original 200 by performing a sensitivity analysis. This type of improvement in the model is necessary to enable the model to be used. Geochemical modeling has established the conditions for the formation of studtite in the UO_2 system.

[LANL] Populating the extent of thick, Tertiary-age, non-marine salt deposits that occur within the Basin and Range Province of Arizona and continued search for shale formation data.

International

[LBNL] Participated in the international TIMODAZ workshop and Mont Terri Technical Meeting, at Mont Terri rock laboratory in Switzerland. Drafting of agreements with CFM and DECOVALEX finalized. Started preparations for DECOVALEX workshop at LBNL, April 17-19

[ANL] Re-initiated dialogue with the Japanese co-chair of the U.S. - Japan Joint Nuclear Energy Action Plan, Waste Management Working Group to see if there is interest in re-starting activities. Offered to send a U.S. delegation to Japan. This was tentatively planned for the spring/summer of 2010, but has been delayed. The Japanese co-chair agreed with a U.S. delegation traveling to Japan in June/July. Arrangements will be made pending re-establishing of the bilateral agreement.

Questions and Discussion?