



U.S. Department of Energy



# Update on the Status of the Yucca Mountain Repository Design and License Application

Presented to:  
**National Spent Nuclear Fuel Program**

Presented by:  
**Guy Martin, Jr.**  
**Sandia National Laboratories-Lead Lab**  
**Licensing**

**March 4, 2008**  
**Washington, D.C.**

# Surface



# Summary of Design Changes Since September 2005

- **Transportation, aging, and disposal (TAD) canisters utilized**
- **TAD canisters reduce handling of individual commercial spent nuclear fuel (CSNF) assemblies at repository**
- **Limited quantity of uncanistered individual CSNF assemblies to be loaded into TAD canisters at the repository**
- **Reconfigured waste handling process and facilities**
- **Waste package configuration suite revised for TAD canisters**
- **Initial Handling Facility (IHF) added**



# Site Layout Changes Since September 2005

- **Waste handling, aging, and support facilities in the same general location as previous layout**
- **IHF allows canisterized high-level waste (HLW) and naval SNF receipt and emplacement with minimal impact to construction of other waste handling facilities**
- **Canister Receipt and Closure Facilities (CRCF) handle all canisterized waste except naval SNF**
- **Receipt Facility (RF) removes canisters from transportation conveyance and places into aging overpack**
- **Wet Handling Facility (WHF) handles uncanisterized fuel (individual fuel elements)**

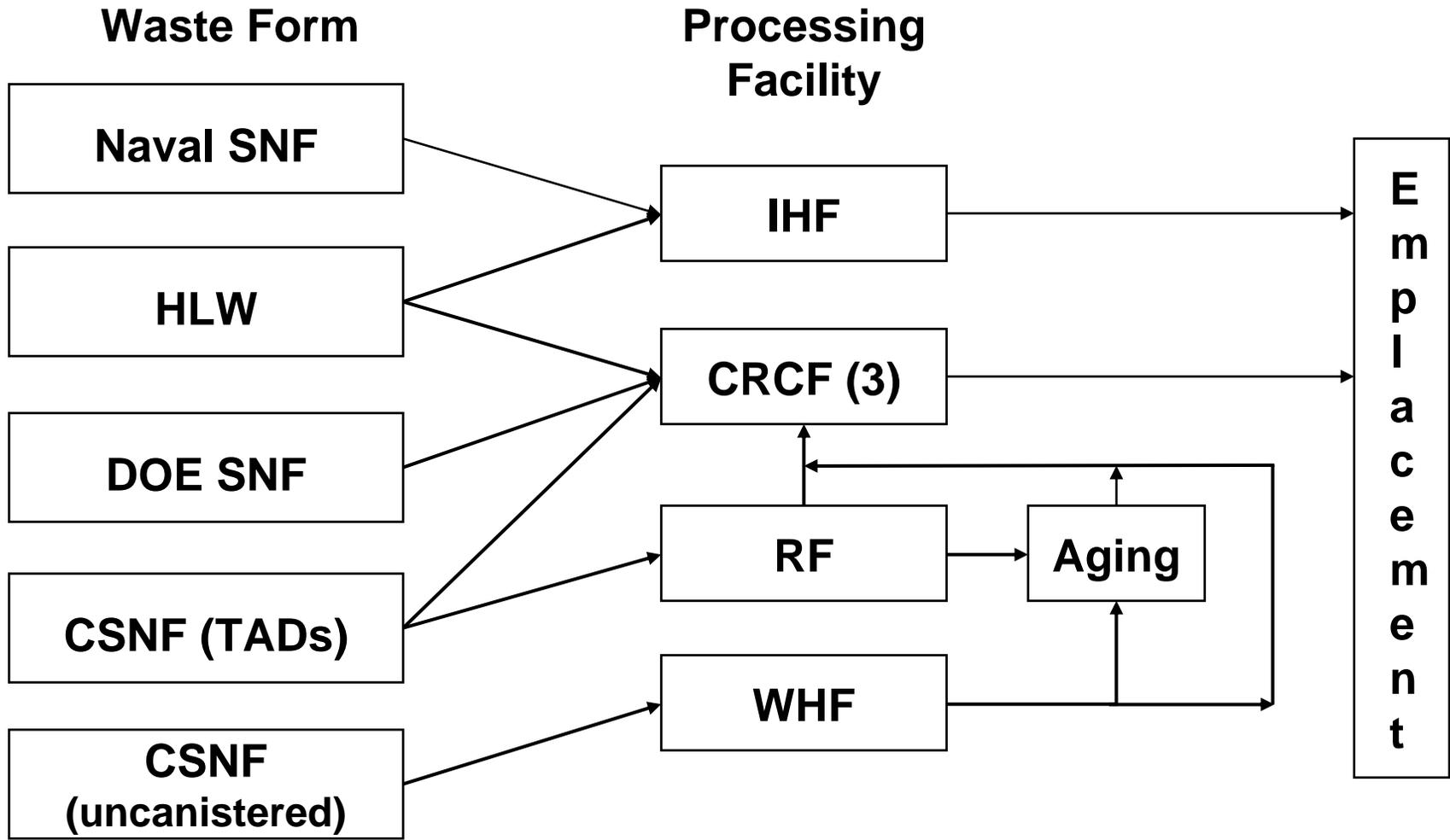


# Waste Handling Changes Since September 2005

- **TAD canister eliminates majority of individual CSNF assembly handling at repository**
- **Remaining uncanistered individual CSNF assemblies handled and loaded into TAD canisters underwater in the WHF**



# Waste Form Processing Overview



# Update of Repository Design Changes Since August 8, 2007



# Waste Handling Facility Pool

- **Decision to borate WHF pool water**
  - Boron provides soluble neutron absorber
  - Proven design practice in commercial pressurized water reactors (PWRs)
  - Boric acid is added to the primary coolant and spent fuel pools of PWRs for control of reactivity
  - A minimum boron concentration of 2500 mg/l in the WHF pool will provide sufficient negative reactivity to ensure subcriticality for all potential credible event sequences in the WHF pool, expected to be important to safety (ITS) and required to be a technical specification
  - Revision to the WHF pool cooling and cleanup system to add chemical addition equipment



# Waste Packages (WPs), DOE SNF Canisters and TAD Canisters



# DOE SNF Canisters

**CRCF will have staging capacity for 10 DOE SNF and HLW canisters**

- **Staging racks inside staging areas will provide adequate separation to preclude criticality**
- **Separation (~32 cm) between canisters is a preclosure nuclear safety design basis**



# WP and TAD Canister

- **Utilize TAD canisters for majority of individual CSNF assemblies**
- **TAD canisters reduce WP configuration suite from 10 to 6**
- **Shield plugs added to WPs used for HLW and DOE SNF to allow for standard closure cell configuration**



# TAD Canister Key Features and Benefits

- **Majority of TAD canisters loaded at utility sites**
- **Smaller quantity of TADs expected to be loaded in repository Waste Handling Facility pool**
- **Significantly reduces individual CSNF assembly handling at repository**
- **Simplifies repository design and operations**
- **Reduces risk at repository**
- **No Category 1 event sequence in preclosure safety analysis due in large part to reduced handling of uncanisterized CSNF assemblies**
- **TAD canister includes shield plug**



# TAD Canister Programmatic Development

- **DOE announced the release of final performance requirements in June 2007**
- **DOE will initiate procurement for the development of final TAD canister and cask designs**
- **DOE anticipates that TAD canisters will be available for commercial use as early as 2011**
- **DOE plans to enter into discussions with nuclear utilities to amend their disposal contracts with DOE to facilitate the use of TAD canisters**



# Subsurface

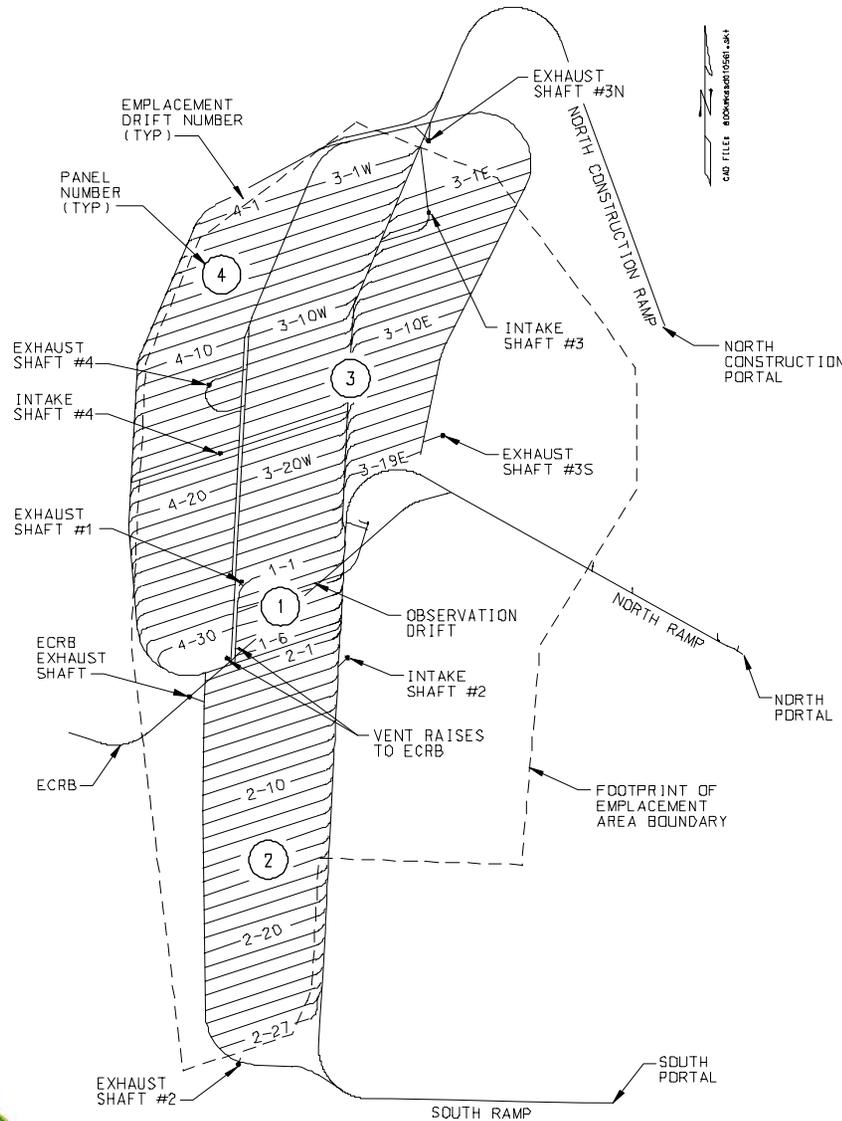


# Subsurface Changes

- **No change in overall emplacement concept**
- **Minor changes in layout**



# Subsurface Layout



- Panel numbers represent the proposed construction and emplacement sequence
- Sequence:
  - 6 drifts in Panel 1
  - 27 drifts in Panel 2
  - 45 drifts in 3E and 3W
  - 30 drifts in Panel 4
- Total emplacement length available is approximately 41 miles (66 km)



# No Change in the Subsurface Design Since August 8, 2007

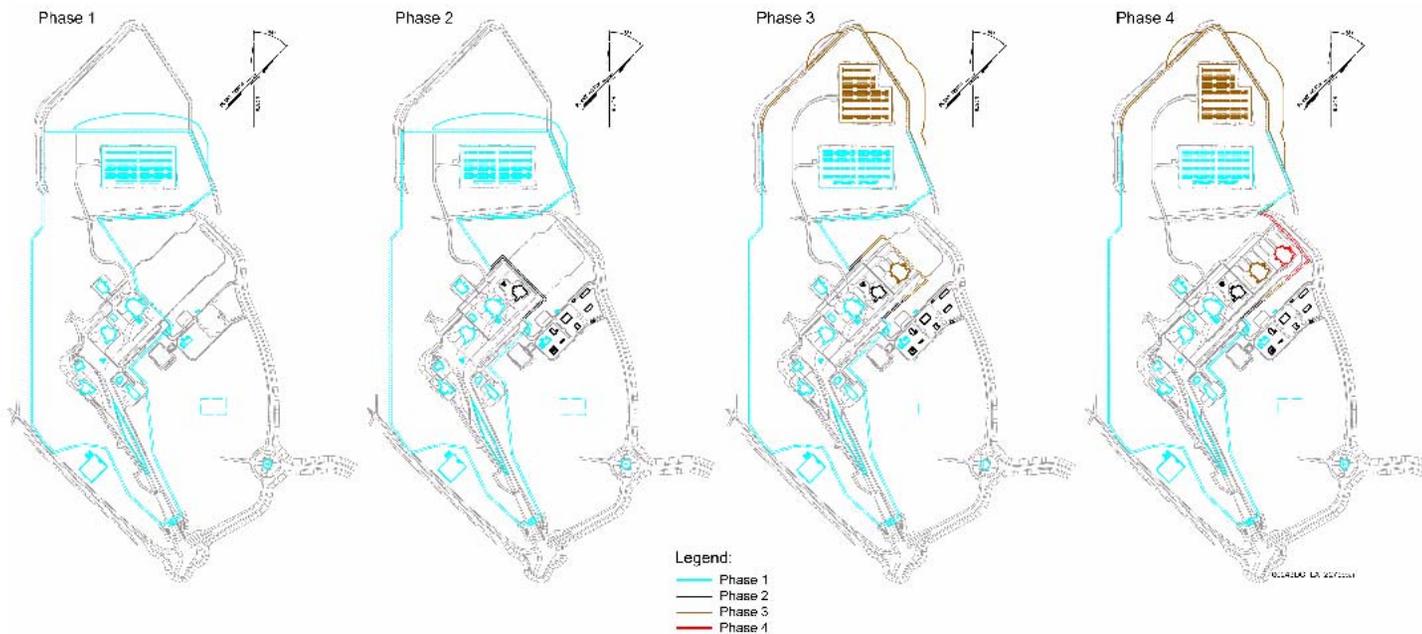


# Phased Construction and Operation

- **Phases designed to facilitate waste receipt and emplacement**
- **Step-wise approach to construction to benefit from lessons learned**
- **No adverse impact on waste handling and emplacement operations from construction activities**
- **Security, monitoring, emergency power, etc., adjust as new phases come on-line**



# Surface Facility Phased Construction



# No Change in Phased Construction and Operation Since January 23, 2007



# Design Update Summary

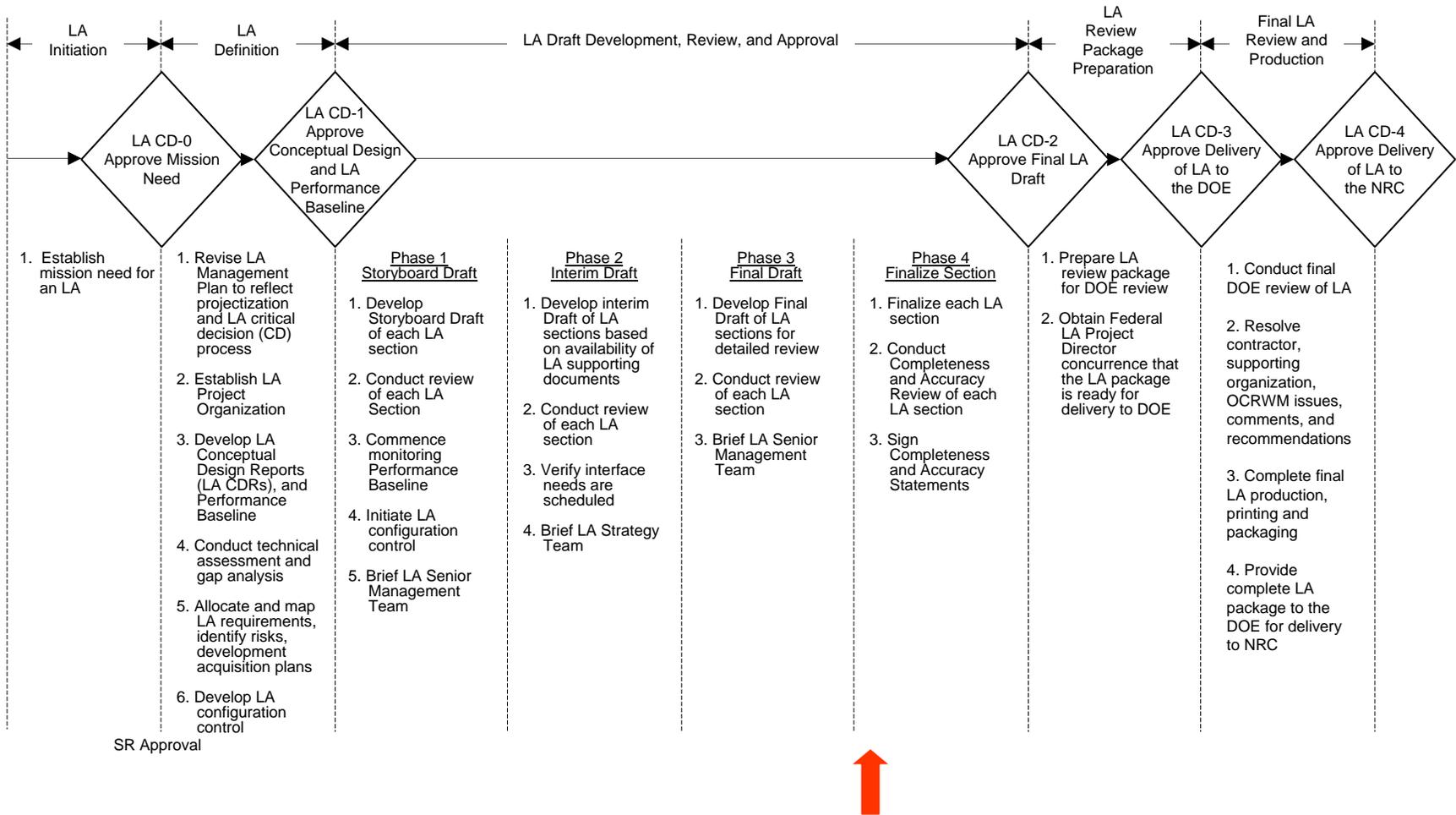
- **TAD canister final performance specifications issued**
- **Decision made to borate WHF pool water**



# License Application Update



# LA Critical Decision Milestones



We are Here



# Lead Lab (LL) Key Dates for LA Completion

- **LL completed Phase 3 for 15 out of 18 LA sections in December 2007**
- **LL completes remaining 3 sections of Phase 3 LA sections no later than March 15, 2008**
- **LL completes Phase 4 of LA sections no later than April 2, 2008**
- **LL LA sections submitted to RW-1 no later than April 7, 2008**



# What is Phase 3?

- **The purpose of Phase 3 is to confirm that**
  - **No new issues have emerged**
  - **Text from the Interim Draft remains consistent**
  - **Legal counsel comments are addressed**
- **Final drafts will consist of all text and most figures and tables for a section**
  - **Missing tables and figures are on an exception-only basis**
  - **Exceptions will be identified on a section punch list**
  - **Placeholders will become punch list items**
  - **Punch list will be reserved for items awaiting finalization of a source document**
- **No unresolved issues are included in the Final Draft unless approved by the Federal LA Project Director**



# Lead Lab Objectives for Phase 3 LA Sections

- **All LL Phase 3 LA sections completed December 2007, with 3 exceptions (Sections 2.1, 2.2, and 2.4)**
- **Sections 2.1 and 2.4 incorporate the TSPA results**
- **Features, Events, and Processes Analytical Model Reports undergone detailed review prior to completion of Section 2.2**
- **Phase 3 of Sections 2.1, 2.2, and 2.4 completed no later than March 15, 2008**



# Requirements for Phase 4 (Final) LA Sections

- **Performance Objectives**
  - Final sections are developed and reviewed
  - The LA Section Team Completeness and Accuracy Statements are signed
- **Key Activities**
  - Authors complete all punch-list items for each LA section
  - Completeness and accuracy review performed and validated
  - BSC General Manager and SNL Senior Program Manager sign, attesting to completeness and accuracy of LA
- **Once Phase 4 LA sections are completed, only RW-1 can approve changes/revisions to LA sections**



# Phase 4 SAR Validation

- **10 CFR Part 63 requires that all SAR sections**
  - Are complete and accurate
  - Accurately reflect information contained in supporting documents (e.g. AMRs)
- **License Application Management Plan also requires that documents supporting LA be validated**
- **SAR Validation will provide objective evidence that LA is**
  - Complete and accurate
  - Ready for submittal to the NRC by documenting that statements that are material to the NRC's review process are supported by appropriate companion documents
- **Validation will require screening SAR sections for material statements. The material statements will be traced to the source document**
- **Material statement is defined as the information that may have an impact or influence in the licensing process**

