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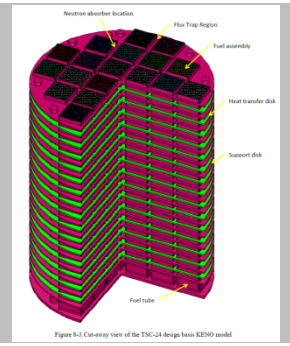

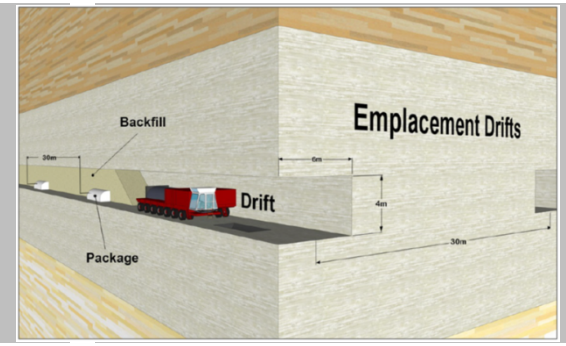

Dual-Purpose Canister Direct Disposal – Introduction

Ernest L. Hardin, Ph.D. (ehardin@sandia.gov)
Applied Systems Analysis & Research/08843, Sandia National Laboratories

Independent Technical Review of Dual-Purpose Canister Direct Disposal R&D, July 15, 2021

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U.S. DEPARTMENT OF ENERGY

National Nuclear Security Administration

Disclaimer

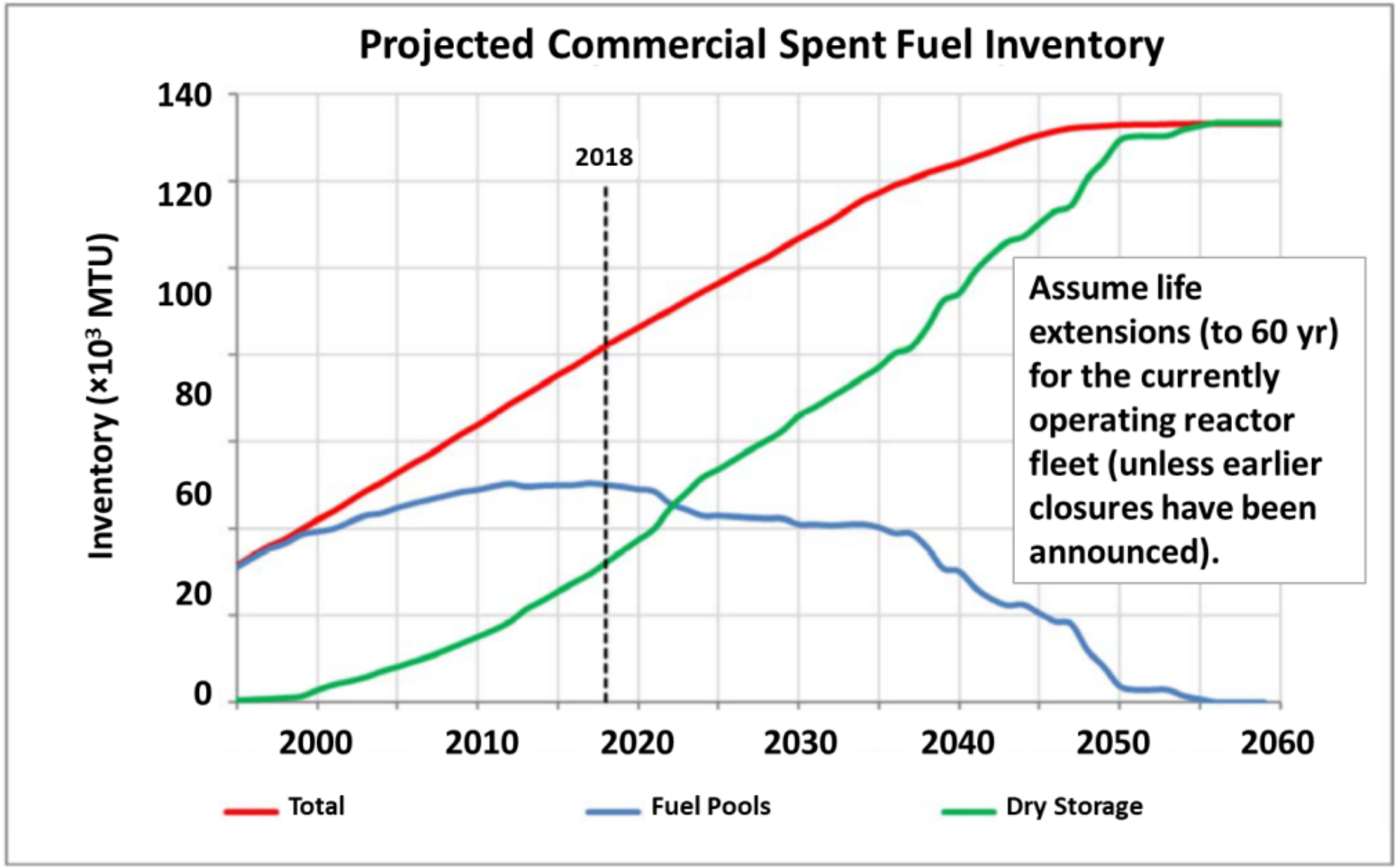
This is a technical presentation that does not take into account contractual limitations or obligations under the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (Standard Contract) (10 CFR Part 961). For example, under the provisions of the Standard Contract, spent nuclear fuel in multi-assembly canisters is not an acceptable waste form, absent a mutually agreed to contract amendment.

To the extent discussions or recommendations in this presentation conflict with the provisions of the Standard Contract, the Standard Contract governs the obligations of the parties, and this presentation in no manner supersedes, overrides, or amends the Standard Contract.

This presentation reflects technical work which could support future decision making by DOE. No inferences should be drawn from this presentation regarding future actions by DOE, which are limited both by the terms of the Standard Contract and Congressional appropriations for the Department to fulfill its obligations under the Nuclear Waste Policy Act including licensing and construction of a spent nuclear fuel repository.

Additional Notice

Projected Accumulation of SNF in Pools and Dry Storage (MTU)



Cost Avoidance Estimates for DPC Direct Disposal vs. Repackaging (ROM)

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Cost Avoidance by Cost Element: All costs in $B	Case 1 Dispose all DPCs with No Treatment or Modification	Case 2 Fillers for Existing DPCs + Zone Loading for Future DPCs	Case 3 Fillers for Existing DPCs + BSS Plates for Future DPCs	Case 4 Fillers for Existing DPCs + DCRAs/ Modified Blades for Future DPCs
No 21P/44B Canisters	-$12.2	-$12.2	-$12.2	-$12.2
Fewer Disposal Overpacks	-$4.64	-$4.64	-$4.64	-$4.64
No Repackaging Operations	-$3.26	-$3.26	-$3.26	-$3.26
No Disposal as LLW	-$1.37	-$1.37	-$1.37	-$1.37
Treat Existing DPCs	$0.00	$0.54	$0.54	$0.54
Modify Future DPCs	$0.00	Note 1	$1.31	$1.91
Net Cost Avoidance	**-$21.4**	**-$20.9**	**-$19.6**	**-$19.0**

Notes:
1. The cost of zone loading (Case 2) is assumed to be minimal.
2. Total inventory 109,300 MTU (YM TSLCC case); 2/3 of estimated 8,160 total DPCs are “future.”
3. **Worker safety and dose effects not included.**
4. Source: A. Alsaed 2019. SAND2019-4070.

DPC Direct Disposal Approaches

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- Disposal Without Modification
  - Reactivity margin (as loaded, existing DPCs, degraded)
  - Criticality consequence analysis (as loaded)
- Injectable Fillers
  - Cementitious or molten fillers that solidify
  - Solid particle fillers may also be considered
- Fuel/Basket Modifications
  - Zone loading
  - Corrosion-resistant neutron absorber materials
  - Other hardware (e.g., PWR disposal control rods)
- Related Topics
  - Modeling of Fuel/Basket Degradation

Agenda (4.5 hours)

1. Introduction (10 minutes, Hardin)
2. Reactivity Analysis (As Loaded) (30 minutes, Banerjee) *
3. Cementitious Fillers (25 minutes, Rigali) *
4. Molten Fillers Investigations (25 minutes, Banerjee) *
5. Criticality Consequence Analysis (30 minutes, Price) *
6. Fuel/Basket Modifications and Degradation Modeling (25 minutes, Hardin) *
7. Testing of Corrosion Resistant Absorber Materials (25 minutes, Lister) *
8. Reactivity Modeling for Modification Approaches (30 minutes, Banerjee) *

* 10 minutes scheduled after each presentation for Q&A

Title