INL/CON-19-52987-Revision-0

History and Status of DOEs Standardized Canister

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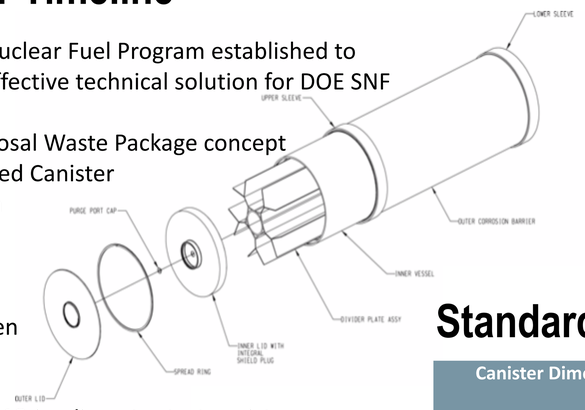
DOE Standardized Canister Timeline

1995

- 1994 National Spent Nuclear Fuel Program established to develop a timely, cost-effective technical solution for DOE SNF management
- 1995 Proposed Codisposal Waste Package concept places a DOE Standardized Canister and 5 HLW canisters in a disposal package



2000

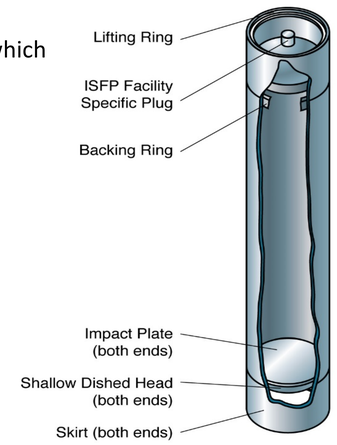
- 1998 Drop tested eleven test specimens onto a rigid surface.
- 1999 Drop tested nine 18-in. diameter test canisters.
- 1999 Began working on Advanced Neutron Absorber (ANA).
- 2001 Foster Wheeler slightly changed the design of the canister.
- 2001 NRC approves Foster Wheeler application to construct and operate a spent fuel storage facility
- 2002 Evaluated DOE canister's ability to maintain leak-tightness with a weld flaw

2005

- 2004 ANA became qualified ASTM material
- 2004 ANA approved for ASME B&PV Code, Section III, Division 3 applications (unwelded)
- 2006 Initiated series of meetings with NRC to confirm canisters could obtain credit for moderator exclusion during transport.
- 2007 Completed material interaction study which concluded adequately drying fuel is the key to assuring canisters can be transported after extended storage.

2010

- 2008 Canister concept submitted with License Application to Yucca Mountain
- 2008 Funding for DOE standardized canister was reduced and eventually suspended
- 2009 Transferred storage license from Foster Wheeler to DOE
- 2011 Prepared report that proposed work to provide the basis for moderator exclusion



Objectives for Canister Design

- Canister breach and radioactive release within the repository is sufficiently low to avert the need for qualified data for consequence analyses
- Criticality safety during pre-closure operations could be based on the canister boundary intrusion of moderator
- No credit for canister integrity would be needed following closure of the repository
- Canister materials would be selected to avoid interaction that could promote unacceptable degradation of the codisposal waste package from the inside

Standardized Canister Specification

Canister Dimensions	Maximum Loaded Canister Weight	Intended Use
45.7-cm (18-inch) diameter 3.05-m (10-foot) total length	2,270-kg (5,005-lb) total weight	Shorter fuels that effectively utilize the length of a 3.05-m (10-foot) canister
45.7-cm (18-inch) diameter 4.57-m. (15-foot) total length	2,721-kg (6,000-lb) total weight	Longer fuels and/or those that can be more efficiently stacked into the 4.57-m (15-foot) canister
61.0-cm (24-inch) diameter 3.05-m. (10-foot) total length	4,081-kg (8,996-lb) total weight	Low-Enriched Uranium (LEU) fuels, or small quantities of canistered HEU material
61.0-cm (24-inch) diameter 4.57-m. (15-foot) total length	4,536-kg (10,000-lb) total weight	High-Enriched Uranium (HEU) High-Flux Isotope Reactor (HFIR) outer assemblies and Shippingport Light-Water Breeder Reactor (LWBR) power-flattening blanket assemblies

Analyses Performed for the DOE Standardized Canister

- Canister Finite Element Analyses
- Canister Drop Tests
- Fuel Grouping
  - Nine Criticality Groups
  - Six DBE Groups
- Chemical Reactivity Analysis
- Materials Interaction
- Criticality Analysis
  - Pre-Closure
  - Post-Closure
- Advanced Neutron Absorbers
  - High Ni C-4 alloy with 2% Gd
- Closure Weld Development
- Radiological Source Term Estimates
- Radiological Dose Consequence Analysis

Remaining Work to Load a DOE Standardized Canister

- Storage
  - Initiate partnership with suppliers of storage systems or overpacks.
  - Identify and develop monitoring and aging-management capabilities to support extended storage.
  - Demonstrate fully remote closure process that includes inspection and repair for canister
- Transportation
  - Complete the work to obtain moderator exclusion.
  - Initiate partnerships with transport cask vendors
  - Develop criteria and inspection technique to ensure canisters maintain performance requirements following extended storage
- Disposal
  - Re-evaluate the basis and need for ANA
  - Consider alternatives to packaging problematic fuels

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