

Regulation of Future Extended Storage and Transportation Transportation-Storage Interface

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Overview

- Changing policy environment
- Regulatory framework—current and future
- Extended storage and transportation—technical information needs
- Next Steps





Current Policy Environment

- **U.S. national policy for disposition of spent nuclear fuel is in transition**
 - **Extended (dry) storage of spent fuel may be necessary**
 - **Alternative disposal options may emerge**
- **NRC's mission remains the same – ensure the safe and secure use of radioactive materials while protecting people and the environment**
- **Consistent with Commission direction, NRC staff is preparing for potential changes in policy**
- **BRC recommendations may provide some insight**



Spent Fuel Storage and Transportation: BRC

- BRC proposed a national nuclear waste management strategy with eight key elements, including
 - A new, consent-based approach to siting future nuclear waste management 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



Potential Implications

- Consolidated facilities?
- Multiple transportation stages?
- Multiple handling stages?
- Statutory changes?

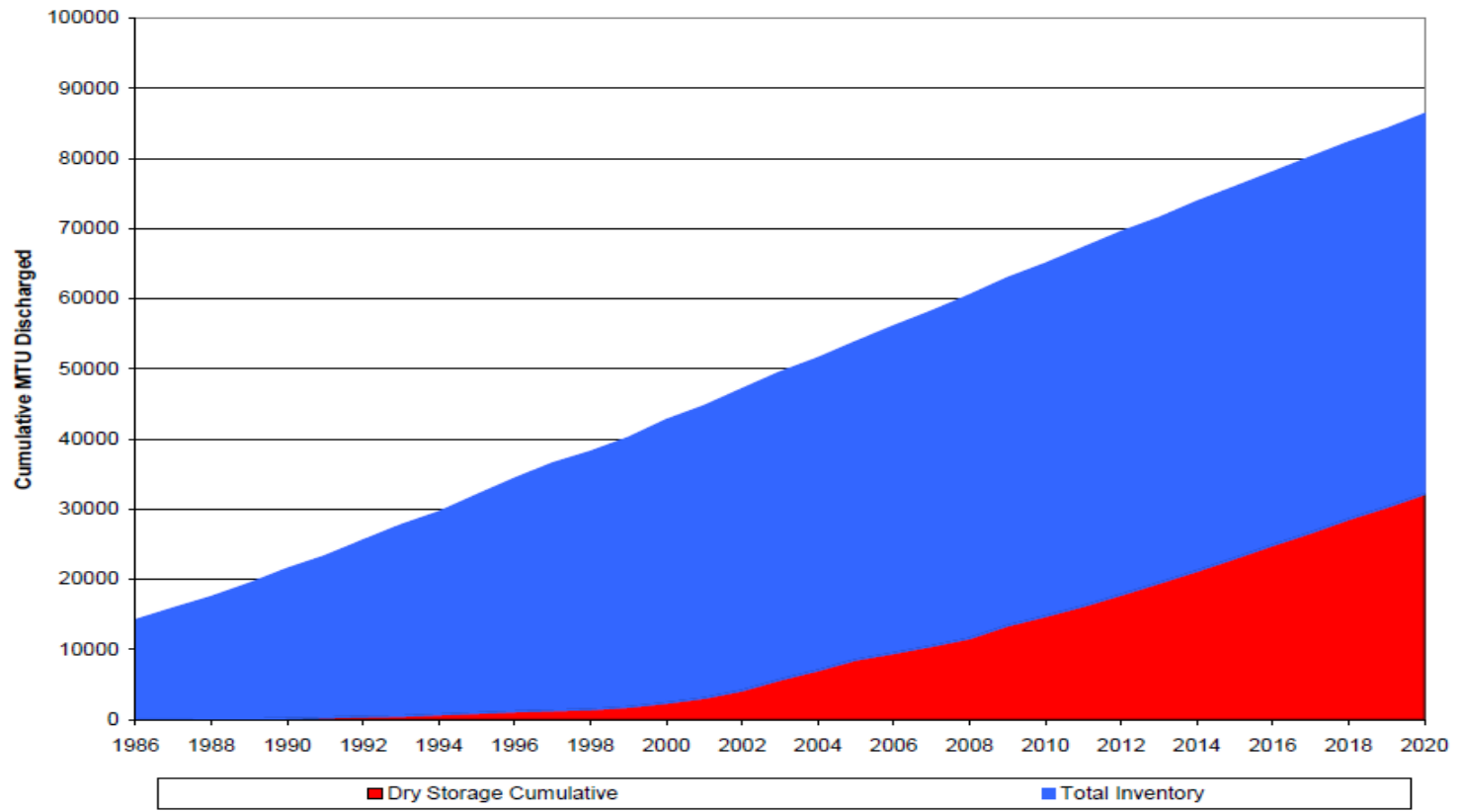


NRC: Complementary Initiatives

- **Waste Confidence Decision Update**
 - Generic determination; not site specific, not for specific licensing reviews or decisions
 - Fulfills legal requirements and NEPA responsibilities
 - Updated in 2010 for licensed facility life plus 60 years
 - Commission directed staff to prepare separate long-term update for beyond life plus 60 years, with Environmental Impact Statement (EIS)
- **Extended Storage and Transportation (EST)**
 - Principally technical studies to provide basis for safe storage over longer periods, and related transportation
 - May involve changes to NRC storage and transportation regulations and guidance



Spent Fuel Storage: Historical and Projected Spent Fuel Discharges



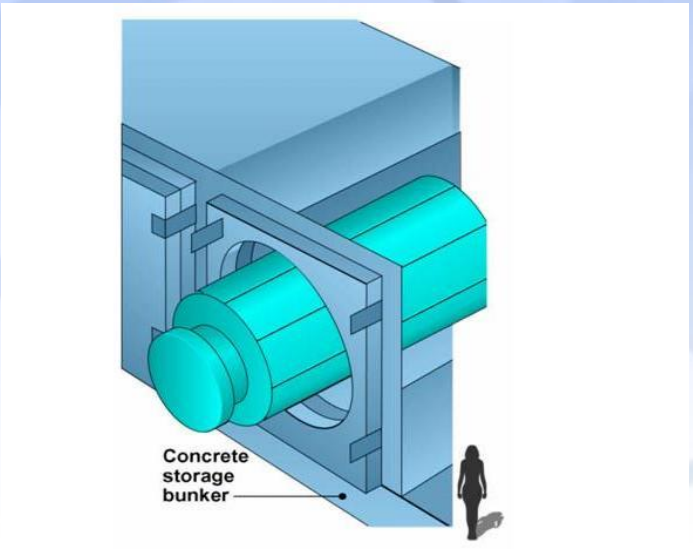
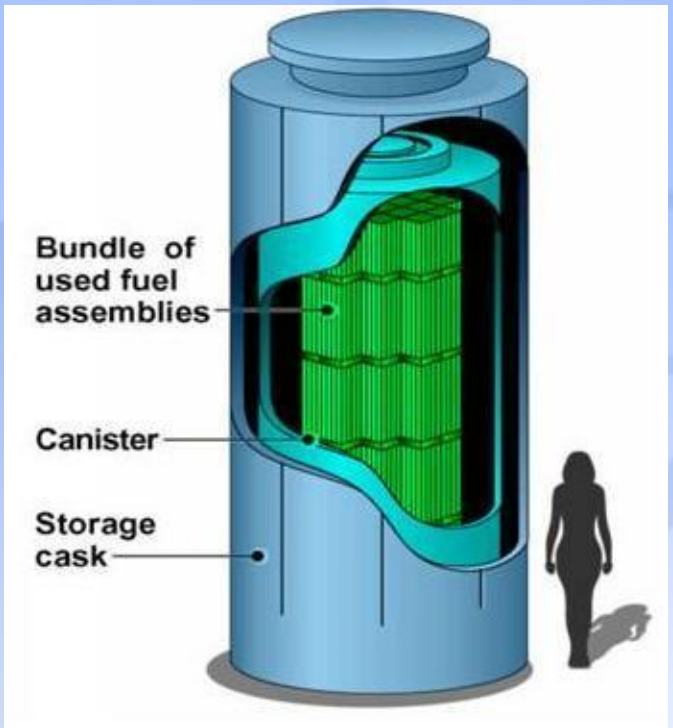
Source: *Impacts Associated with Transfer of Spent Nuclear Fuel from Spent Fuel Storage Pools to Dry Storage After Five Years of Cooling*, Electric Power Research Institute, 2010



Spent Fuel Storage: Dry Storage Systems

Single and Dual Purpose Casks

Once the spent fuel has cooled in wet storage, it is loaded into special canisters which are designed to hold assemblies from Pressured-Water Reactors or Boiling-Water Reactors. The canister is filled with inert gas, welded or bolted shut, and rigorously tested for leaks. It can then be placed in a “cask” for storage or transportation.

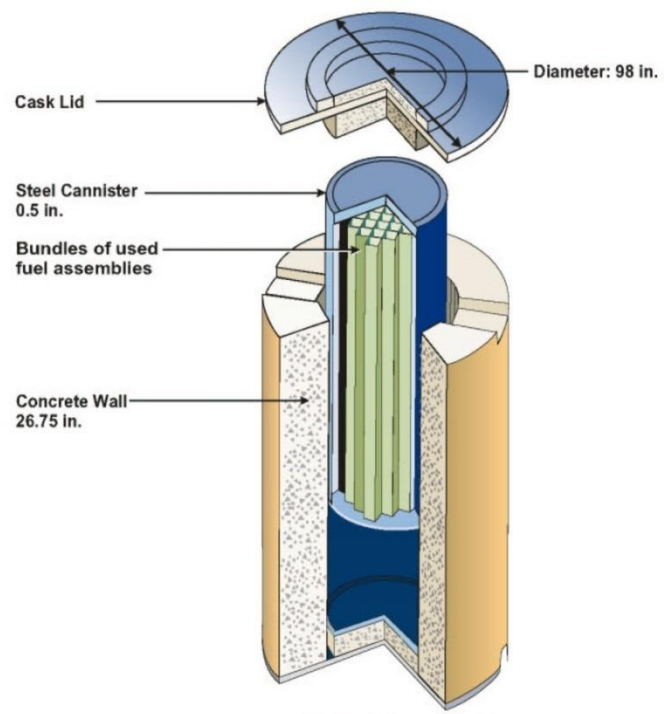


The canisters can be stored in above-ground bunkers, each of which is about the size of a one-car garage.



Spent Fuel Storage: Dual Purpose Cask Systems

Dual Purpose Storage Cask*

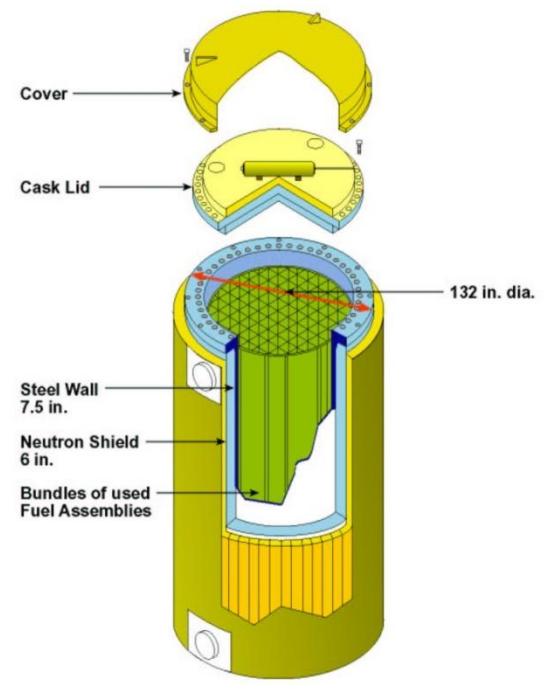


(Holtec International HI-STORM 100)

Overall Length: 197 to 225 in.
Loaded Weight: 360,000 lbs.
Typical Payload: 24 PWR Bundles

* Storage and Transportation

Dual Purpose Cask*



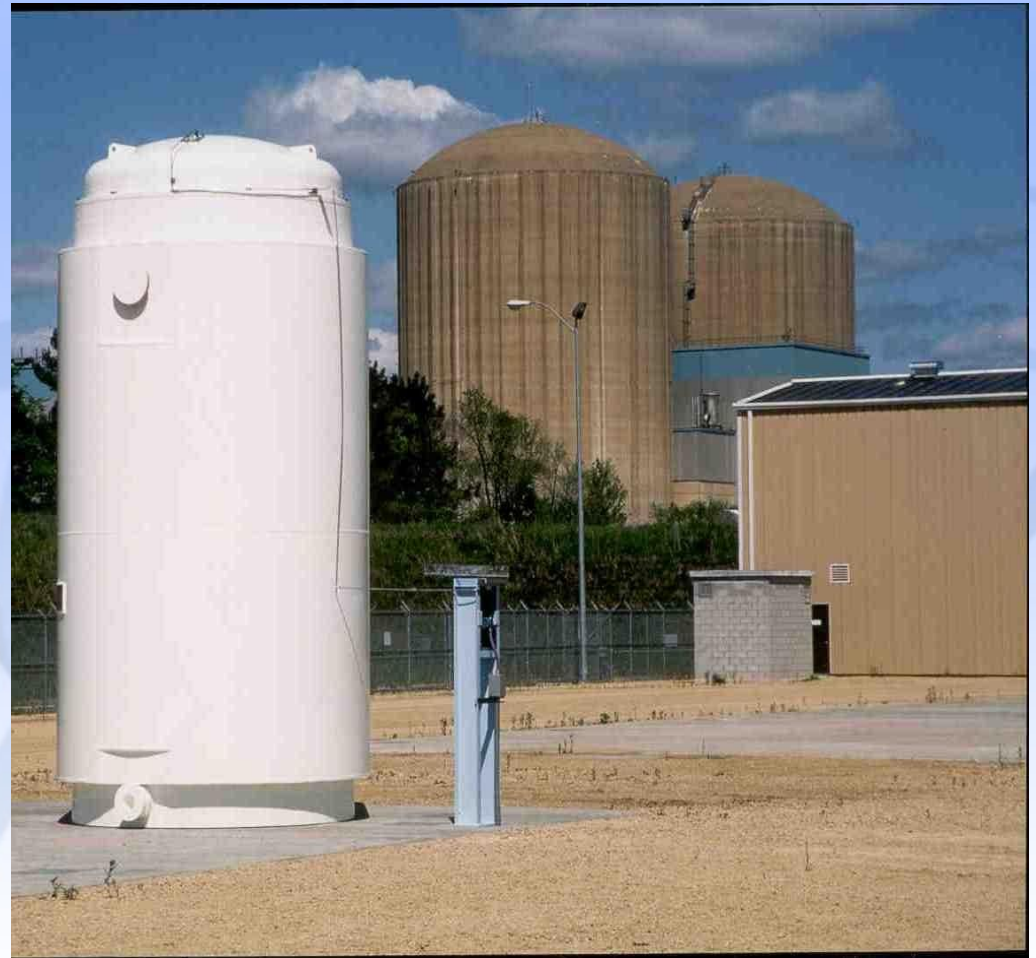
(Transnuclear TN-68)

Overall Length: 178 in.
Loaded Weight: 240,000 lbs.
Typical Payload: 68 BWR Bundles



Spent Fuel Storage and Transportation: Framework

- **Dry Storage**
 - 10 CFR Part 72
 - Term certificates and licenses
 - Aging management plans for renewal
 - Multiple renewals allowed
- **Transportation**
 - 10 CFR Part 71
 - Term certificates with renewal
 - Certification generally separate from storage





Extended Spent Fuel Storage and Transportation: Needs

- **Potential changes to regulations and guidance to accommodate extended storage and transportation of long-stored spent fuel**
- **Technical information to inform the potential regulatory changes and support future licensing reviews**
 - **Identify technical issues associated with long-term storage**
 - **Perform focused research on technical issues of regulatory significance**



Extended Spent Fuel Storage and Transportation: Technical Info

- **Design criteria – Safety functions**
 - **Confinement**
 - **Criticality control**
 - **Structural integrity**
 - **Radiation shielding**
 - **Thermal control**
- **Ability to retrieve stored fuel by normal means**
- **Possible impacts for transportation of long-stored spent fuel**



Extended Spent Fuel Storage and Transportation: Methodology

- **Focus on potential degradation phenomena on systems, structures, and components**
- **Consider impact on performance of safety function for storage and transportation**
- **High priority technical information needs have**
 - **Overall low level of knowledge**
 - **Overall high regulatory impact**



Draft Report for Comment

**Identification and Prioritization of the
Technical Information Needs Affecting
Potential Regulation of Extended Storage
and Transportation of Spent Nuclear Fuel**

May 2012



Extended Spent Fuel Storage and Transportation: Technical Needs

- **High priority degradation areas:**
 - Stress corrosion cracking of stainless steel canister body and welds
 - Degradation of cask bolts
 - Fuel pellet swelling and fuel rod pressurization
- **High-priority cross-cutting areas:**
 - More realistic thermal model calculations
 - Effects of residual moisture after canister drying
 - In-service monitoring methods for dry storage systems
- **Other (slightly) lower priority degradation areas:**
 - Cladding creep, fatigue, flaw propagation
 - Fuel assembly hardware corrosion and embrittlement
 - Neutron absorber degradation
 - Microbially influenced corrosion
 - Concrete degradation



Extended Spent Fuel Storage and Transportation: Regulatory Areas

Potential regulatory areas

- Long term cladding integrity and retrievability
- Integration of storage, transportation, and disposal
- Long-term financial assurance
- Physical security
- Risk information





Extended Spent Fuel Storage and Transportation: Next Steps

- Issued draft report on *Technical Information Needs Affecting Potential Regulation of Extended Storage and Transportation* for public comment
 - available at <http://www.nrc.gov/waste/spent-fuel-storage/public-involvement.html> and in ADAMS at accession number ML120580143
 - Comment period now open through June 18, 2012
 - Send email to ESTOutreach@nrc.gov for notifications
- Technical investigations have begun in selected high-priority areas
- Planning for further technical investigations in other areas



Conclusions

- **NRC is continuing to perform its mission while preparing for potential policy changes**
- **NRC has begun technical work on extended storage and transportation of spent fuel**
- **Initial NRC staff efforts have defined tasks and developed plans and schedules**
- **Draft report for technical needs been issued for public comment (comments close June 18, 2012)**
- **Staff is seeking best ways to continue productive interaction with public, industry, and other stakeholders**