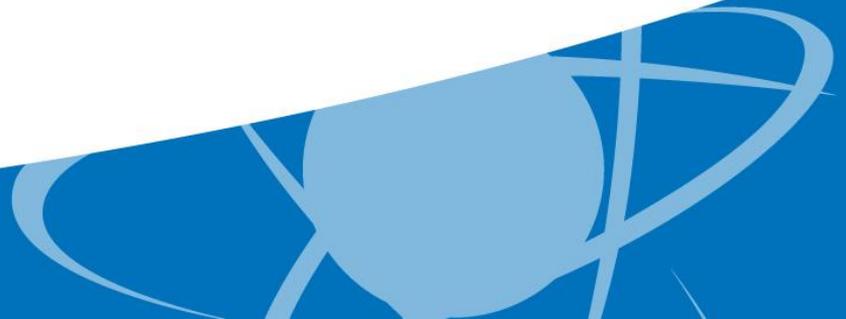


Activities of the NRC's Division of Spent Fuel Management: An Overview

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Agenda

- Yucca Mountain License Application and EIS supplement
- Spent Nuclear Fuel Storage
- License Renewal/Aging Management Programs
- Spent Nuclear Fuel Transportation
- Consolidated Interim Storage Facility
- Fire Studies
- NUREG-2125: Spent Fuel Transportation Risk Assessment
- Tribal Policy Statement

NRC Staff Review of the Yucca Mountain License Application and EIS

Overview

- Background – how did we get here?
- Yucca Mountain Safety Evaluation Report
- Environmental review
 - Status of the draft EIS Supplement

How did we get here?

- **Framework**
 - National Environmental Policy Act
 - Nuclear Waste Policy Act
- **Activities**
 - 1) YM license application review and Safety Evaluation Report (SER), 2008-2011; 2013-2015
 - 2) Environmental review
 - Department of Energy (DOE) environmental impact statements (EIS) in 2002 and 2008
 - NRC staff review and Adoption Determination Report in 2008
 - Preparation of Supplement to the EIS, 2015-2016

1) NRC Safety Evaluation Report (NUREG-1949) *Disposal of High-Level Radioactive Waste in a Geologic Repository at Yucca Mountain, Nevada*

Volume 1: General Information

Volume 2: Repository Safety before Permanent
Closure

Volume 3: Repository Safety after Permanent Closure

Volume 4: Administrative and Programmatic
Information

Volume 5: Proposed Conditions on the Construction
Authorization and Probable Subjects of
License Specifications (Jan 2015)



Scope and status of the YM SER - 1

The Safety Evaluation Report (SER) provides NRC staff's evaluation of the license application for the construction authorization submitted by U.S. DOE for the proposed repository at Yucca Mountain. The SER addresses whether the license application satisfies requirements in 10 CFR Part 63 for the disposal of high-level radioactive waste in a geologic repository at Yucca Mountain.

NRC staff found, with reasonable assurance, that DOE's application meets the applicable regulations, with two exceptions. NRC staff determined in Volume 4 of the SER that DOE has not satisfied certain regulatory requirements regarding (1) ownership of the land where the facility would be located, and (2) the rights to the water necessary to construct and operate the repository. Thus, NRC staff did not recommend issuance of a construction authorization.

[The SER is available on the NRC website at: <http://www.nrc.gov/waste/hlw-disposal/key-documents.html#sers>]

YM SER - 2

Publication of the SER is only one of several steps that must be completed before a decision can be made on the construction authorization application. A decision on whether to authorize construction, assuming that the water- and land-related regulatory requirements are met, can be made only after:

- A supplement to DOE's environmental impact statement regarding potential impacts of the proposed action on groundwater has been prepared (in progress) – *next slides*
- A hearing has been completed on contested issues, and
- The Commission has completed its review of contested and uncontested issues.

2) Draft Supplement to DOE's EISs for Proposed Yucca Mountain Repository

- NRC staff found in the Adoption Determination Report (2008) that the EISs could be adopted, but that supplementation was needed
- Scope of needed supplementation:
 - Impacts on groundwater beyond the regulatory compliance point
 - Impacts from surface discharge of groundwater beyond the regulatory compliance point
 - To include radiological and nonradiological contaminants

Why is the NRC staff supplementing DOE's EIS?

- NRC review and hearing process was suspended in 2011
- Restarted in 2013 after Court decision
- As part of this, NRC requested that DOE complete the supplement; DOE deferred to NRC
- NRC staff began work on supplement after completing the SER in January 2015
- Draft supplement issued for public comment on Aug. 21; comment period ended on Nov. 20

What is the potentially affected area?

- Area of groundwater flow path that could include contaminant releases from repository
- Groundwater flow path beyond regulatory compliance location
- Surface discharge areas (pumping and natural)

Scope is limited because NRC staff found the EISs otherwise appropriate for adoption

What is the framework for analysis?

- Radiological and nonradiological contaminants
- One million years after repository closure
- Builds on DOE's model of repository performance, as assessed and found acceptable in NRC staff's SER

What conditions are analyzed?

- Groundwater pumping
 - Pumping for irrigation
 - No pumping, possible natural discharge

Climates

- Hot and dry (similar to present day)
- Cooler and wetter (future)

What does the supplement conclude and why?

- Potential direct and indirect impacts would be small
- Potential cumulative impacts would be small
- Impacts are consistent with NRC staff understanding of contaminant transport through the aquifer

Final supplement expected in first half of 2016.

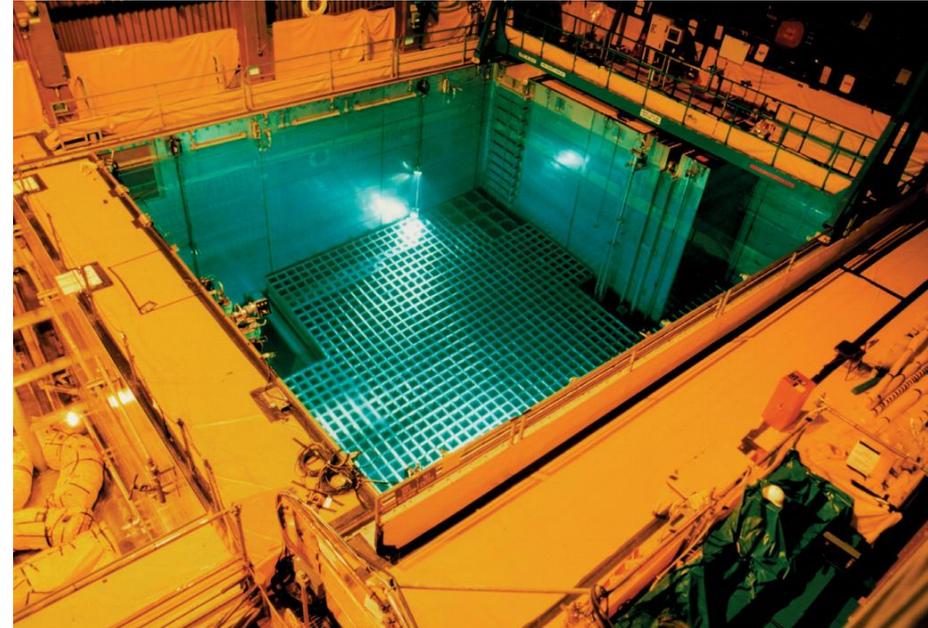
Backgrounder handout: ML081550392

YM License Application handout: ML15251A537

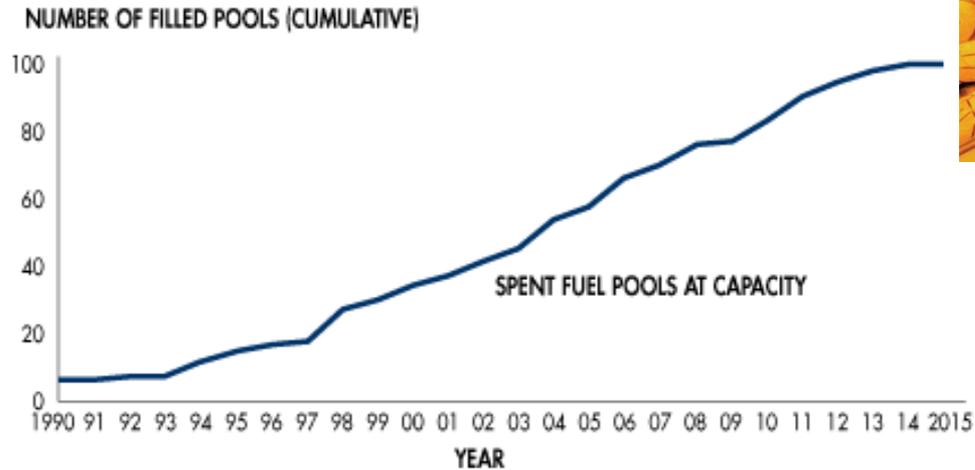


Spent Fuel Pools

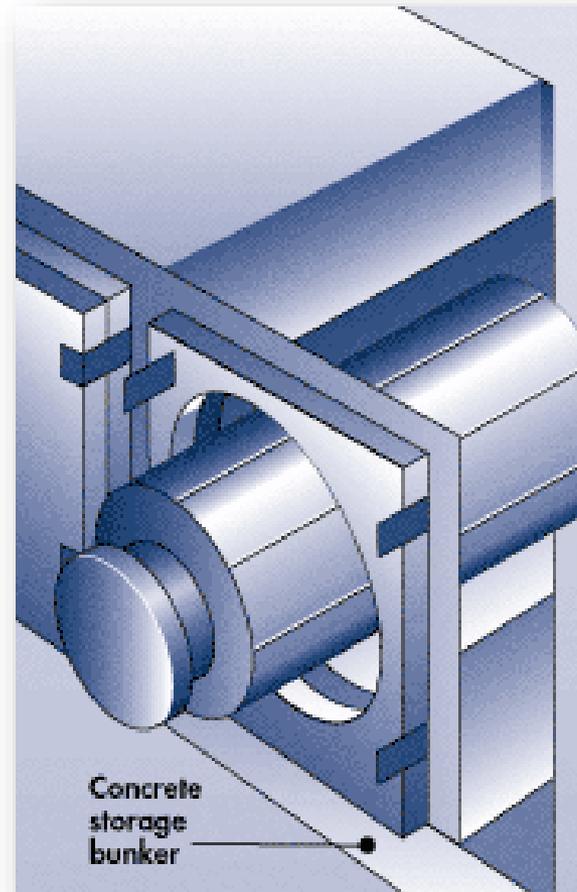
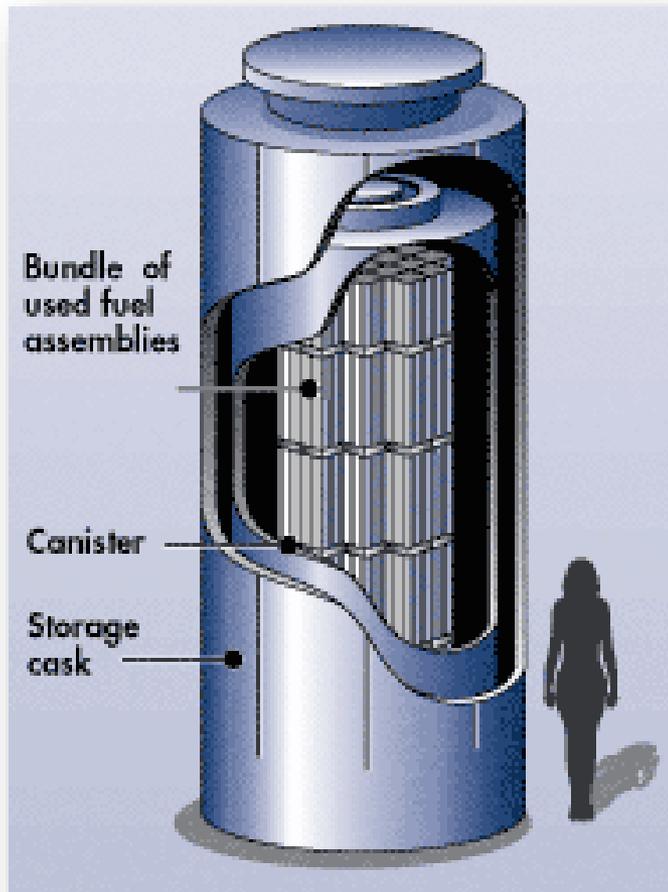
- More than 170,000 spent fuel assemblies are stored in spent fuel pools at 65 reactor sites in 33 states
- Water cools the fuel and shields workers from radioactivity



San Onofre Nuclear Generating Station

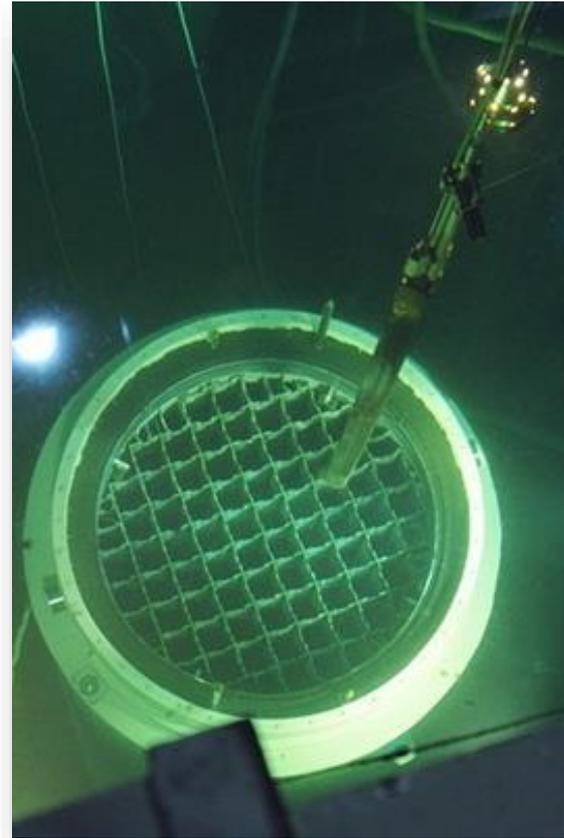


Typical Dry Storage Designs

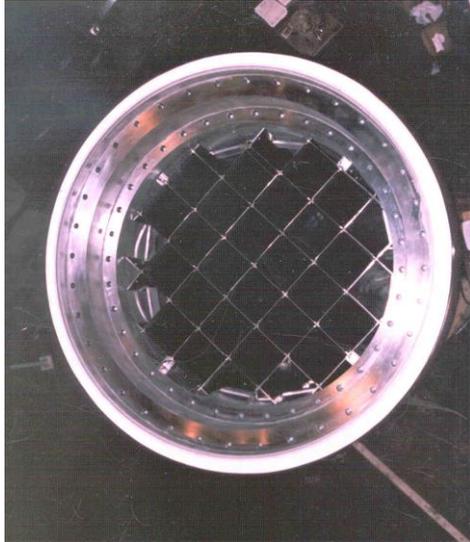


Transfer to Dry Storage

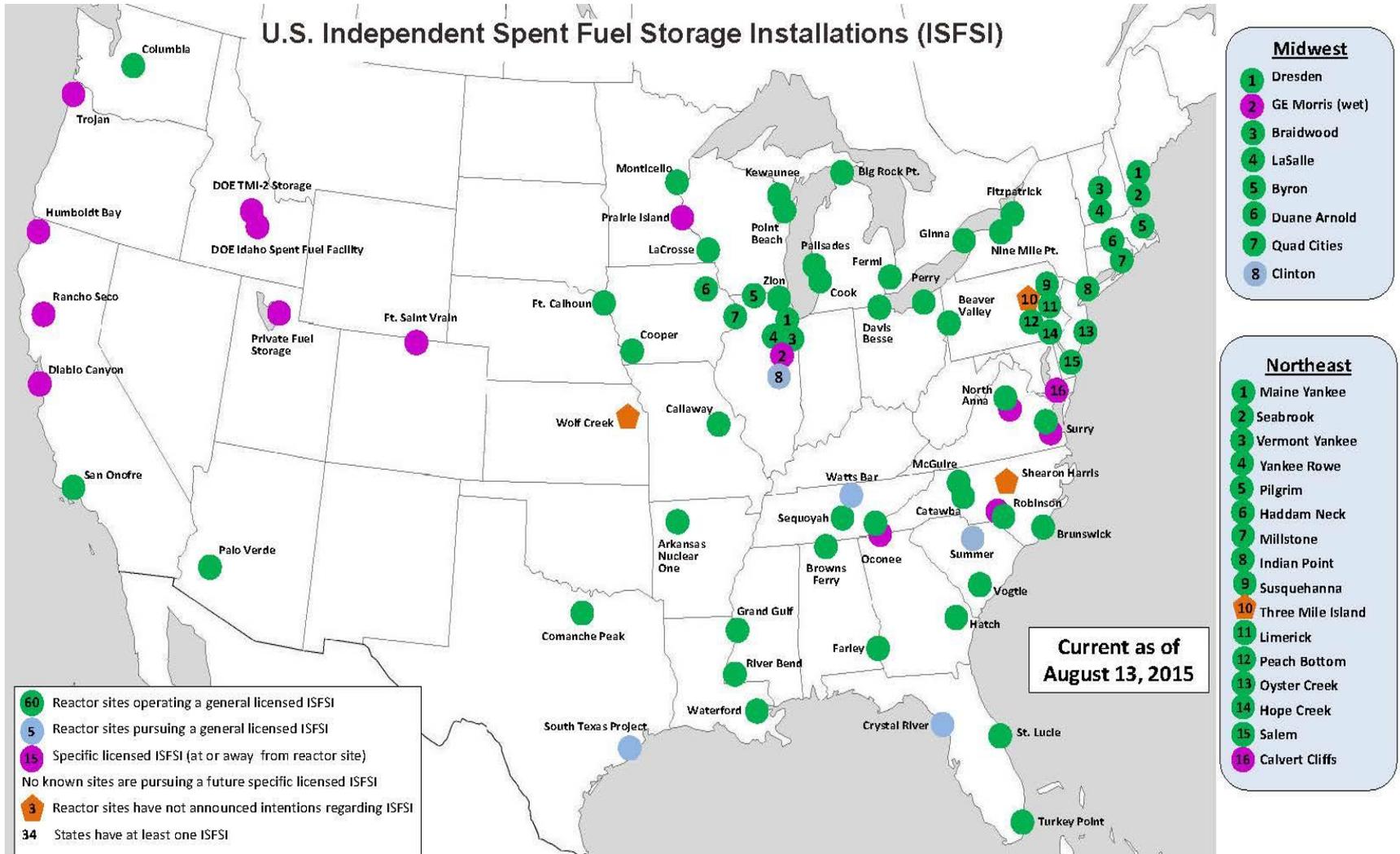
- Load fuel into the storage canister in the fuel pool
- Close (weld or bolt)
- Drain
- Dry
- Backfill with helium
- Transfer to storage pad (with shielding overpack, as necessary)



Dry Storage Systems



Independent Spent Fuel Storage Installations (ISFSIs)

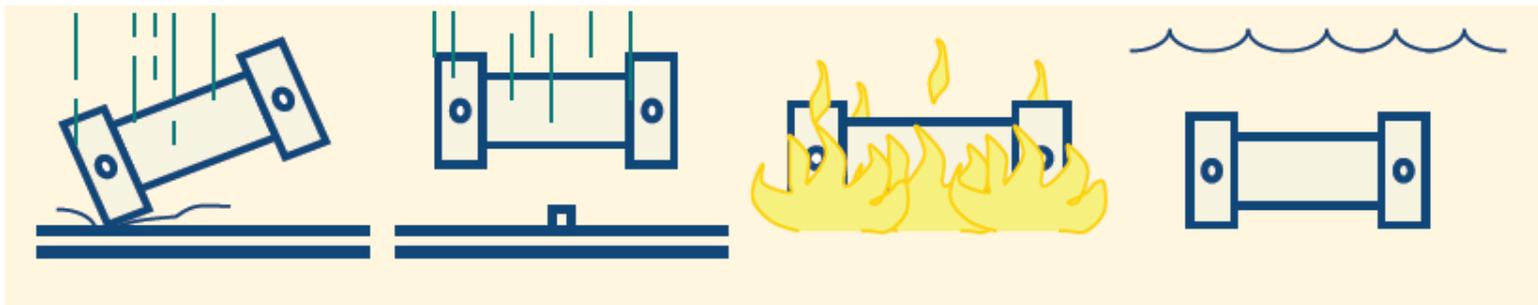


License Renewal/Aging Management Programs

- Storage for a period of up to 40 additional years
- Licensee must demonstrate that storage can safely continue in light of potential component degradation
- Aging management
 - Aging Management Programs (AMPs) provide measures to prevent and/or identify degradation
 - Time Limited Aging Analyses (TLAAs): calculations that demonstrate that a component can maintain its function throughout the new term
- NUREG-1927, Rev 1, “Standard Review Plan for Renewal of Specific Licenses and Certificates of Compliance for Dry Storage of Spent Nuclear Fuel, Revision 1”

Spent Nuclear Fuel Transportation

- Prevent the loss or dispersion of radioactive contents
- Shield everything outside the cask from the radioactivity of the contents
- Dissipate the heat from the contents
- Prevent nuclear criticality from occurring inside the cask



Consolidated Interim Storage Facility

Waste Control Specialists (Texas)

- Intends to apply for license in 2016
- In partnership with cask vendors, AREVA and NAC International
- Phase 1 to include storage of spent nuclear fuel from up to ten decommissioned nuclear power generation facilities

Holtec International and the Eddy-Lea Energy Alliance (New Mexico)

- Intends to apply for license in 2016
- Underground system



NUREG-2125, Spent Fuel Transportation Risk Assessment

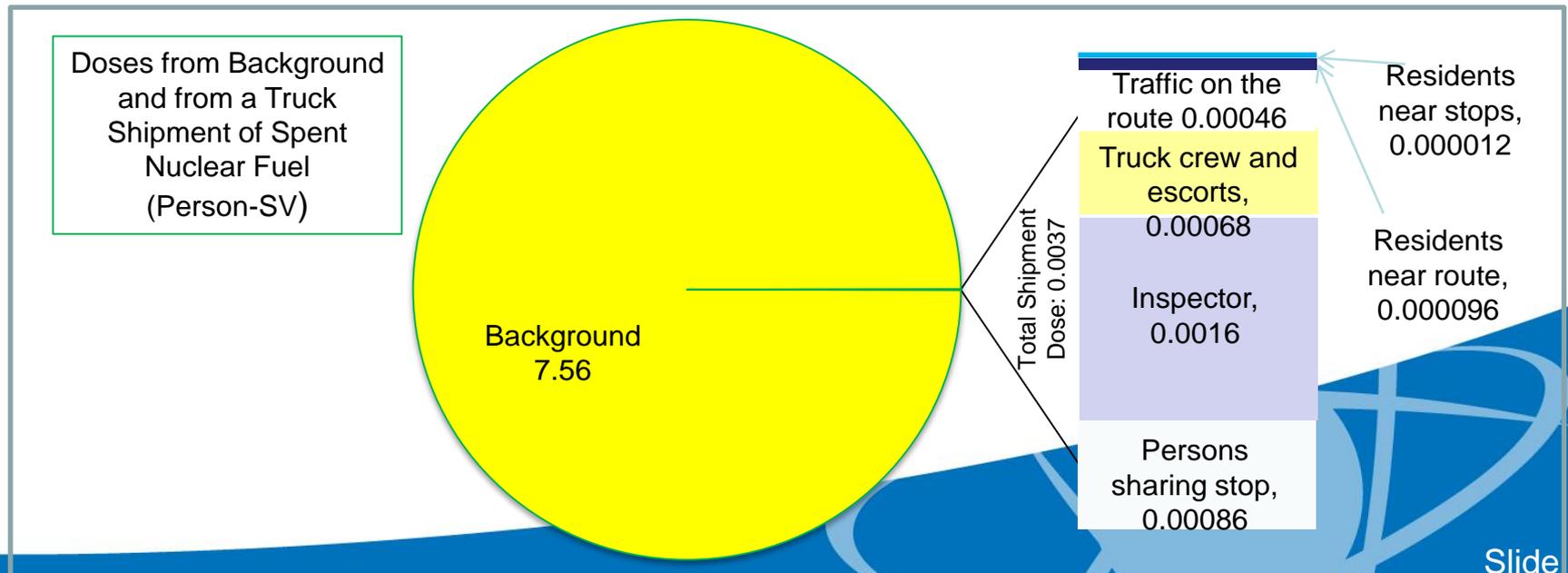
- Investigates safety provided by regulations during spent fuel transportation under both routine and accident conditions
- NRC's fourth investigation over the last 35 years
- Improvements in accident analysis
 - finite element analysis of NRC-certified rail and truck cask designs
 - direct loaded and canistered fuel contents
 - example U.S. cross-country truck and rail routes with updated accident statistics

NUREG-2125, Spent Fuel Transportation Risk Assessment

- Results
 - Routine conditions: collective doses are about four to five orders of magnitude less than collective background radiation dose over the same time period and exposed population as the shipment.
 - Accident conditions: contents would not be released in any U.S. historical accident if the fuel is contained in a welded canister inside the cask.

NUREG-2125, Spent Fuel Transportation Risk Assessment

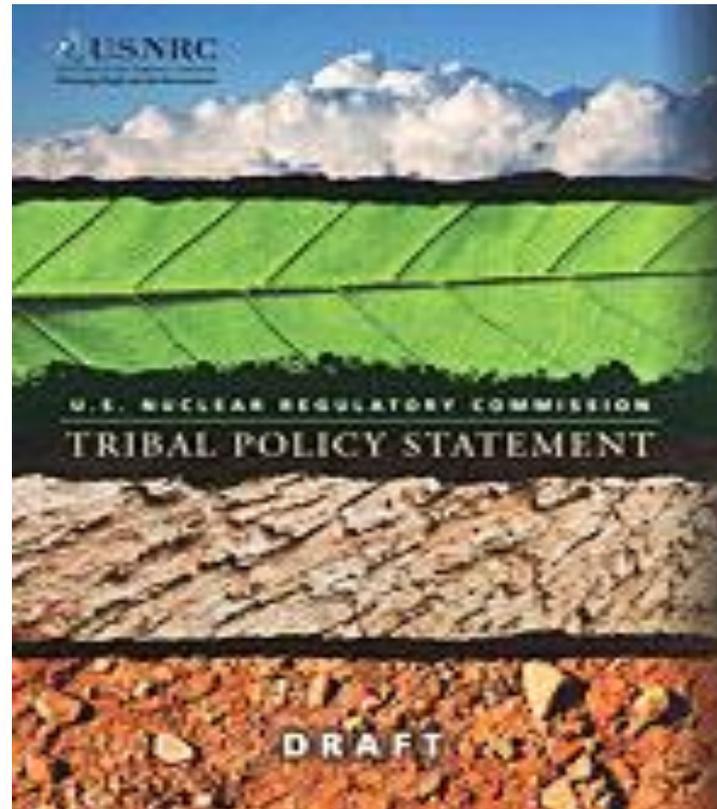
- Radiation emitted from a cask during transportation is a fraction of the natural background radiation
- The risk from accidental release is extremely low
- Regulations are adequate to protect the public against unreasonable risk



Fire Studies

- To study the effects of extra-regulatory thermal conditions on spent fuel transportation packages
 - Choose case studies of documented accidents from which “real-world” boundary conditions (temperature, heat flux, open/enclosed surroundings, time of fire, etc.) are determined
 - Computer simulation to “place” a transportation package within that accident environment and analyze its response
- Non-radioactive material accident information reviewed from US DOT, Federal Railroad Administration, NTSB
 - Actual road and rail accidents with severe fires:
 - Baltimore Tunnel Fire (rail)
 - Caldecott Tunnel Fire (road)
 - MacArthur Maze Fire (road)
 - Newhall Pass Fire (road)
 - None of these scenarios involved radioactive material
 - Accident conditions (temperature, results from structural interactions, etc.) served as boundary conditions for analytical models of spent fuel packages
- Results of analyses indicated packages met regulatory requirements
- NUREG/CR-7209

Tribal Policy Statement



Questions?



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PROJECT



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DELIVERING OUR FUTURE