



Retrievability, Cladding Integrity, and Safe Handling during Storage and Transportation

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Outline

- Background
- Review objectives
- Applicable regulations
- Solicitation of stakeholder comments
- Comment overview
- Associated research activities
- Path forward

Background

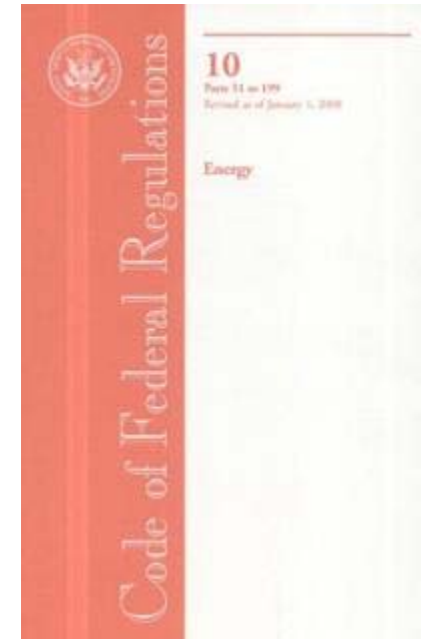
- **COMDEK-09-0001** (Feb 2010)
 - Undertake a thorough review of spent fuel storage and transport regulatory programs beyond 120 years
- **COMSECY-10-0007** (June 2010)
 - Plan for Near-Term Licensing and Inspection Program Improvement Review
 - Plan for Extended Storage and Transportation (EST) Program
 - Potential Policy Issues
- **SRM-SECY-09-0900** (Sept 2010)
 - Develop a Plan for a Long-Term Rulemaking to update Waste Confidence (WC) beyond 120 years
 - Integrate Plans and Resources with Staff Plans in COMSECY-10-0007
- **SECY-11-0029** (Feb 2011)
 - Plan for Development of WC EIS
 - Strategy and Prioritization for Integrating with EST Activities
 - Separates Near-Term Program Improvement Plans from broader WC/EST challenges

Review Objectives

- Perform a comprehensive review of storage and transportation regulatory safety framework in accordance with SRM-COMSECY-10-0007
- Identify and address potential policy issues related to the new paradigm of storing spent fuel for longer, unknown timeframes
- Incorporate two decades of regulatory experience into enhancing the regulatory frameworks

Applicable Regulations

- Storage
 - Retrievability – §72.122(l) (see SECY-01-0076)
 - Cladding integrity – §72.122(h)
- Transportation
 - Criticality control – §71.55 and § 71.59
 - Fissile material geometry after normal conditions of transport – §71.55(d)(2)
 - Opening and unloading operations – §71.89 and §20.1906(e)



Overarching Considerations

- Different back end model prior to disposal
- Longer and uncertain storage durations
- Uncertainties of high burnup fuel material properties
- Transportation of sealed canisters that have been in storage for many years, maybe twice
- Potential repackaging

Federal Register Notice (78 FR 3853)

- Issued January 18, 2013
- Requested feedback on:
 - Acceptance of spent fuel by a future disposal or reprocessing facility
 - Spent fuel retrievability during storage
 - Cladding integrity
 - Transportation retrievability



Spent Fuel Acceptance Considerations

- Over 1700 loaded storage casks and loading and storing 160 casks each year
- Will repackaging occur prior to DOE acceptance or disposal?
- What should NRC assume about the ability of repository licensee to
 - Repackage large quantities of damaged fuel
 - Dispose of currently loaded canisters
- Totality of back end of the fuel cycle

Spent Fuel Acceptance Comments

- Mixed response on assuming repository will be able to dispose of currently stored fuel without repackaging
- NRC should assume that a damaged fuel will be able to be repackaged on a large production scale
- Large fraction of damaged fuel shouldn't have any effect on future reprocessing facility
- Currently loaded canisters are not an acceptable waste form without modification of standard contract. Spent fuel must be retrievable for packaging into a DOE-supplied transportation cask (DOE)

Retrievability Considerations

- Individual Fuel Assembly Retrievability
 - Maximizes future handling options
 - Additional cladding research and laboratory studies
 - Implement storage demonstration programs
- Canister-Based Retrievability
 - Rely upon dual-purpose canister technologies
 - Overcomes some near-term licensing/certification hurdles due to cladding material property uncertainties
 - May need additional research on canister behavior

Retrievability Comments

- Support for canister-based retrievability
- Performance-based criteria suggested instead of specifically calling out either approach

Cladding Integrity Considerations

- Storage
 - Typically used to meet retrievability requirements for intact assemblies
 - Provides criticality geometry control
 - Confinement provided by canister/cask
- Transportation
 - Geometry control for criticality safety
 - Eases unloading and handling at receipt facility
 - Containment provided by packaging
- Repackaging at disposal facility

Cladding Integrity Comments

- Support for maintaining current cladding integrity requirements
- Cladding integrity not needed to ensure safety
- Currently maintained for flexibility and easier operations for disposal or reprocessing

Transportation Retrievability Considerations

- After normal conditions of transport
- Compatibility with centralized storage after transport
- Should explicit cladding integrity regulation be extended to transportation after normal conditions of transport

Transportation Retrievability Comments

- Mixed responses about requiring transportation retrievability and cladding integrity
- Some indicated that requirements in §71.55(d)(2) already require “retrievability”

Research Related to Retrievability

- NRC research on high burnup fuel
 - Cladding properties during transport on-going
 - Consequence analyses nearly complete
- Chloride-induced stress corrosion cracking for stainless steel canisters
 - NRC research nearly completed
 - EPRI/Industry Roadmap in development
- EPRI/Industry Extended Storage Collaboration Program

Path Forward

- Finish assessment of public comments in evaluating policies on retrievability and cladding integrity for storage and transport
- Complete NRC research activities and follow industry research efforts on cladding integrity
- Continue to interface with international counterparts
- Make a determination whether current policy, regulations, or guidance should be revised
- Make appropriate changes



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