Requirements and Guidelines on Spent Fuel Loading Campaign

FCMA Seminar on Spent Fuel Initial Loading
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Requirements and Guidelines on Spent Fuel Loading Campaign - Overview

- Activities of dry cask storage operation
- Inspection program overview
- Industry codes/standards and Staff Guidance

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Activities of Dry Cask Storage Operation – Loading Operations

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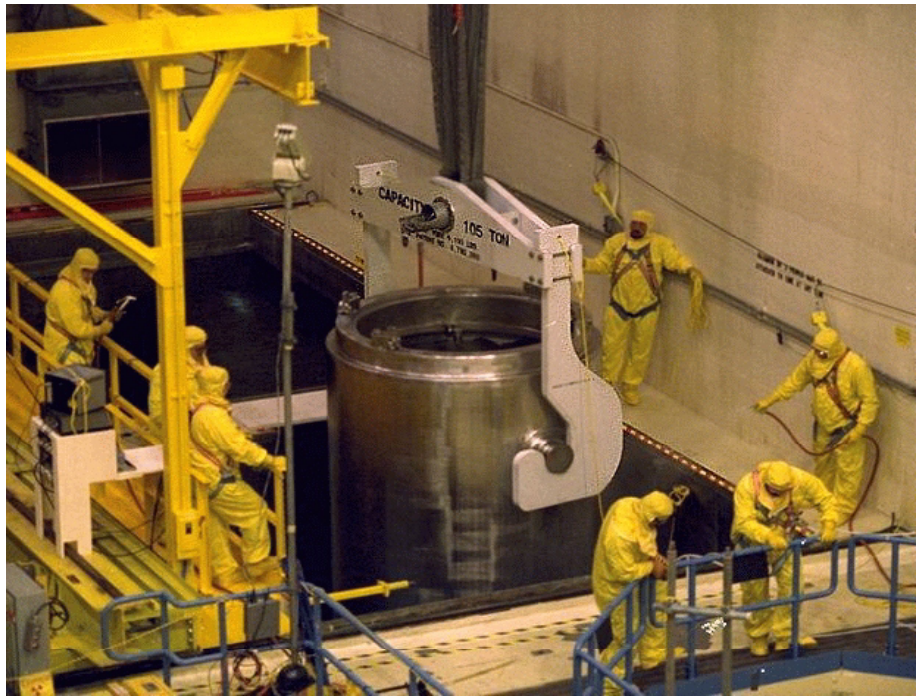
Activities of Dry Cask Storage Operation – Loading Operations



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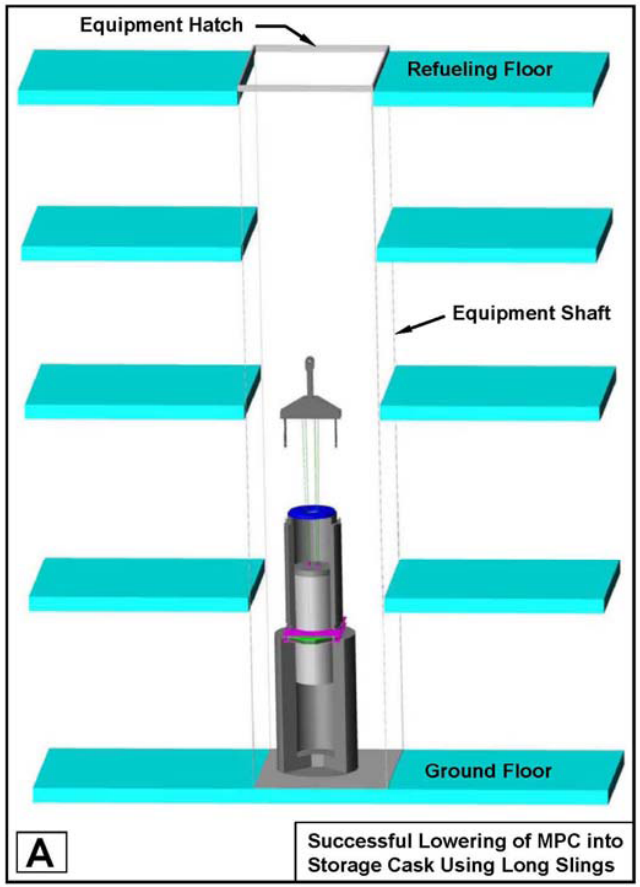
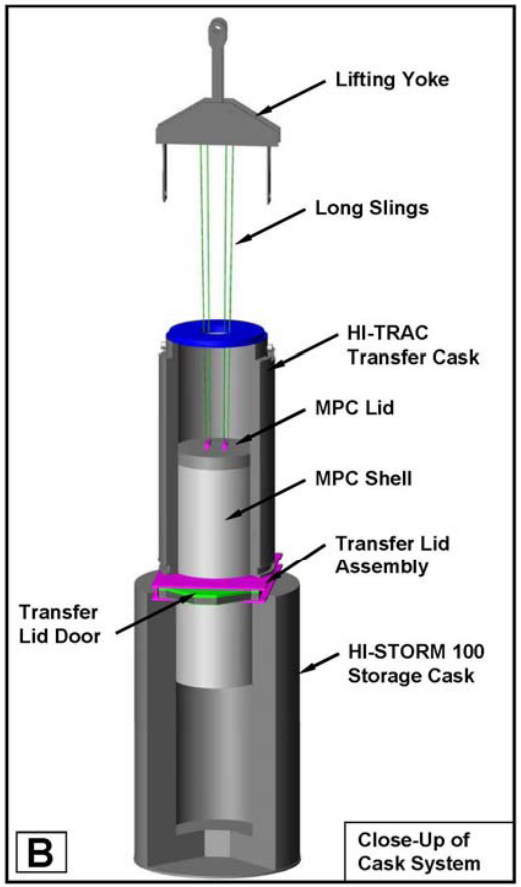
Activities of Dry Cask Storage Operation – Heavy Loads Control





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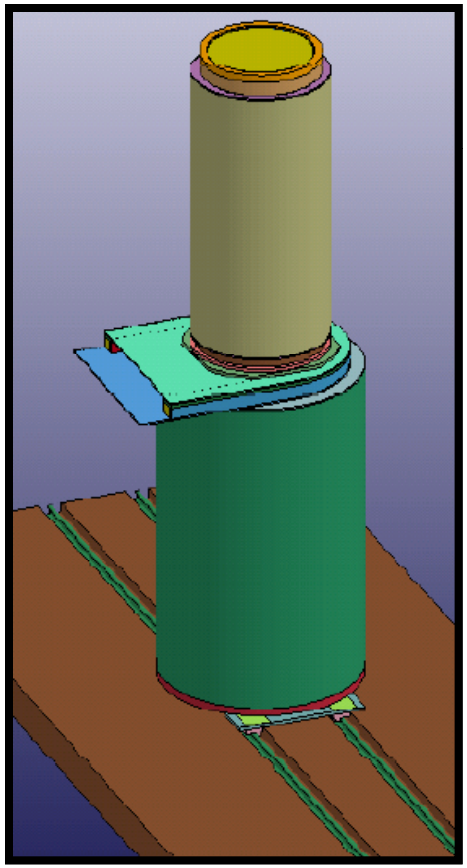
Activities of Dry Cask Storage Operation – Loading Operations



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Activities of Dry Cask Storage Operation – Loading Operations

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Activities of Dry Cask Storage Operation

Question?

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Inspection Program Overview - Inspection Procedures

- SFST inspects cask vendor and fabricator activities (IP 60851 and 60852)
- Regions inspect on-site vendor activities and licensee pre-operational and operational activities (IP 60853, 60854, 60855 &81001)
- SFST supports pre-operational inspections and additional support as requested (typically IP 60856 and 60857)

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Inspection Program Overview - Pre-operational "Dry Run"

- Licensees develop, implement and evaluate by dry run, activities to safely load, and retrieve spent fuel from the dry cask storage system
- NRC inspectors evaluate whether the licensee has
  - Developed, implemented, and evaluated preoperational test activities
  - Fulfilled all test acceptance criteria
  - Made changes to appropriate plant programs to support operation of the ISFSI

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Inspection Program Overview - Activities to Consider

- Verify that the licensee procedures related to the ISFSI have been integrated into the appropriate plant programs:
  - Plant operations
  - Radwaste storage and handling
  - Control of heavy loads
  - Radiation protection
  - Security and safeguards
  - Emergency preparedness
  - Maintenance
  - Surveillance
  - Fire protection
  - Training
  - Environmental monitoring
  - QA activities
  - Administrative procedures

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Inspection Program Overview - Highly Reliable Load Handling System

Single-Failure-Proof Crane per NUREG-0554

- Robust structural design capable of stopping and holding rated load during the design-basis earthquake
- Redundant and independent load paths; increased safety factor permitted for lifting device and hook in place of redundant load paths
- Controls to sense overlaod/overspeed/overtravel conditions and stop load motion; failure of controls does not affect ability to stop and hold the load
- Many other provisions, including design against two-blocking, machinery alignment, manual emergency operation of the brakes, etc.

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Inspection Program Overview - Control of Heavy Load Movement

General good practices from NUREG-0612

- Define safe load paths
- Develop procedures for load handling operations
- Train and qualify crane operators (ASME B30.2)
- Use appropriate lifting devices (ASME B30.9 & ANSI N14.6)
- Inspect, test, and maintain the crane (ASME B30.2)
- Crane designed to appropriate standard (CMAA-70)

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Inspection Program Overview - ISFSI Access Database

- Database shared by NRC Region Inspectors
  - ANSI 14.6, 1993
  - CFR general license, security
  - CFR site-specific license
  - concrete standards, ACI 318-95, ACI 349-01
  - FSAR amendments, major cask models
  - Single-failure-proof hoist topical reports
  - Single-failure-proof cranes and heavy loads
  - More to be added

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Inspection Program Overview

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Industry Codes/Standards and Staff Guidance - ANSI N-14.6

- Stress Design Factors for critical loads lift
  - 6 times combined weight, against yield strength
  - 10 times combined weight, against ultimate strength
- Ancillary equipment committed in FSAR
  - not part of general license cask system certification
  - load-bearing pins, extension links, and adapters
- Minimum service temperature for ferritic steel components
- Acceptance testing
  - cask trunnions, single load path, at 300% design capacity
- Continuing Compliance
  - periodic load testing and inspection

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Industry Codes/Standards and Staff Guidance - NOG-1 2010

- Application of Criteria for NOG-1,Type I Cranes
  - Acceptable for satisfying NUREG-0554 guidelines
  - Single-failure-proof – capability to stop and hold the critical load
- NOG-1-2010, Appendix C, “NUREG-0554/ASME NOG-1 Conformance Matrix”
- Seismic Evaluation of Crane Structure - upgrade to SFP
  - Loaded cask on hook for SSE qualification of the crane and support structure
  - Crane finite element analysis (FEA) models
    - Boundary conditions at trolley and runway rails
    - Trolley locations and hoist positions
    - Damping values

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Industry Codes/Standards and Staff Guidance - RIS 2005-25 S1

- Clarification of NRC Guidelines for Control of Heavy Loads
  - Rigging Used with Single-Failure-Proof Handling Systems
    - ANSI N14.6 – 1993, "…Special Lifting Devices for Shipping Container Weighing 10,000 Pounds (4500 kg) or More"
    - ASME B30.9-2003, "Slings"
  - ASME NOG-1-2004, "Rules for Construction of Overhead and Gantry Cranes"
    - criteria for Type I cranes – acceptable for satisfying NUREG-0554 guidelines
- Staff participation in the ASME Code Committee
  - ASME NOG-1-2010, Appendix C, "NUREG-0554/ASME NOG-1 Conformance Matrix"

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Industry Codes/Standards and Staff Guidance

Question?