Commercial Spent Fuel Storage in the United States

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Commercial Spent Fuel Storage in the US

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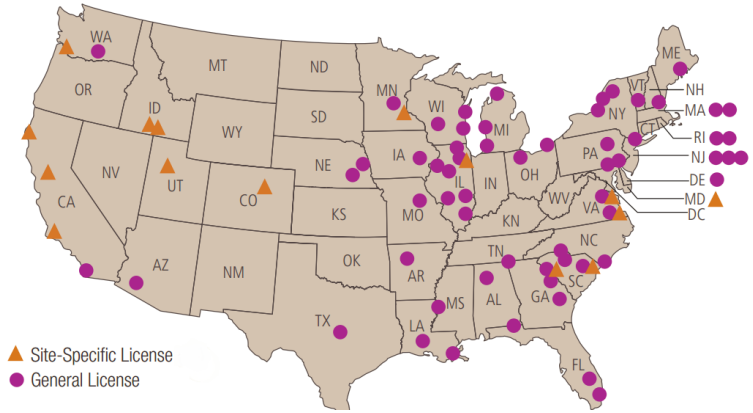
- Fuel Types
  - BWR & PWR
  - Others
- History
  - Moratorium on Reprocessing
  - Nuclear Waste Policy Act & Amendments
- Currently 75 Independent Spent Fuel Storage Installations (ISFSIs)
  - 2,300 Casks/Modules storing 95,000 Fuel Assemblies



General ISFSI Requirements

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- Ensure safe dose to member of public
  - Less than .25 mSv/yr (25 mRem/yr) to nearest *real* individual during normal operation
  - Less than 50 mSv/yr (5 Rem/yr) at nearest boundary during accident conditions
- Confinement
- Criticality Safety
- Retrievability

General and Specific Licensed ISFSI

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- General License:
  - Regulations authorizes a reactor license holder to store spent fuel onsite in dry storage casks
  - License holders select a storage cask from a vendor with an approved Certificate of Compliance (CoC)
  - CoCs are initially licensed and renewed for terms not to exceed 40 years

- Specific License:
  - Granted by the NRC after a safety review of technical requirements and operating conditions of the ISFSI
  - Specific licenses are initially licensed and renewed for terms not to exceed 40 years

Typical General License Design

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- Canister
  - 2.5 cm thickness
  - Criticality / Confinement
- Cask/Module
  - 1 m thickness
  - Structural / Radiological
- Capacity
  - 24 – 40 PWR Assemblies
  - 52 – 89 BWR Assemblies

Specific License Examples

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- General Electric Hitachi Morris Operations – Pool
- Humboldt Bay – Underground
- Prairie Island – Heavy Walled Bolted
- Fort St. Vrain – Vault
- Idaho National Laboratory / TMI-2 – Vented Debris

ISFSI Inspection Phases

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Phase 1 – Pad design, fabrication, and construction

Phase 2 - Preoperational readiness, dry runs, program reviews, and reactor plant engineering reviews

Phase 3 – Initial spent fuel loading operations

Phase 4 - Storage monitoring of the loaded ISFSI and routine inspection

Phase 1 – Pad Design, Fabrication, and Construction

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- Subsoil Backfill and Compaction
- Rebar Placement
- Concrete Testing and Placement
- Quality and Management Oversight
- Pad Structural Engineering

- 1 Week Onsite
- 1 Week Offsite

Phase 2 – Preoperational Readiness, Dry Runs, Program Reviews, and Plant Engineering Reviews

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- Onsite
  - Heavy Loads Outside Dry Runs
  - Heavy Loads Inside Dry Runs
  - Fuel Moves Dry Runs
  - Canister Processing Dry Runs
  - Crane and Crane Support Structural Engineering Reviews
  - Lay Down Areas Structural Engineering Reviews
- Offsite
  - Verification of Fuel Selection and Characterization
  - Training Reports
  - Procedure Review
  - Cask System Compatibility Review
  - Crane and Crane Support Structural Engineering Reviews
  - Lay Down Areas Structural Engineering Reviews
  - Misc. Engineering Reviews (Fire/Tornado/Explosion/etc.)
  - Corrective Action Program Review
  - Emergency and Quality Assurance Plan Review
- 2-3 Weeks of Onsite ISFSI Demonstrations
- 1-2 Weeks of Onsite Engineering Reviews

Phase 3 – Initial Spent Fuel Loading Operations

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- Observe Entire 1st Canister Loading
- Monitor Subsequent Canister Loadings of 1st Campaign From Regional Office
- 1-2 Weeks of Onsite Inspection

Phase 4 - Storage Monitoring of the Loaded ISFSI and Routine Inspection

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- Environmental Reports
- Crane Preventive Maintenance
- Corrective Action Program
- Change, Tests, and Experiments
- Surveillance Reports
- Procedure Changes
- ISFSI Condition
- Observe Operations Loading of a Canister
- Fuel Selection
- Site Security

- Every 2 Years or As Needed
- 1 Week Onsite

Operational Experience

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- Failure to follow canister processing procedures
- Failure to load fuel in accordance with approved contents
- Failure to adhere to emergency plan and emergency plan requirements
- Failure to perform adequate non-destructive evaluations on confinement barriers lid welds
- Failure to perform adequate fuel building structural evaluations
- Failure of crane control systems cause suspended loads
- Failure to perform adequate engineering structural evaluations

Challenges for Decommissioning Sites

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- Community engagement
- Knowledge management
- Maintaining high quality standards
- Resource and labor management
- Control of contractors
- Critical path towards decommissioning
- Future geological disposal

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Questions