



pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Radiation Protection



Nuclear Power Plant Decommissioning

Appalachian Compact Commission Annual Meeting

November 8, 2019

Tom Wolf, Governor

Patrick McDonnell, Secretary

What is Decommissioning?

- Removal of a facility from service and reduction of residual radioactivity to a level that permits termination of the NRC license
- NRC requires the licensees to decommission the nuclear plant after it ceases power operations
- NRC regulates and provides oversight of the decommissioning process

Decommissioning Methods

- **DECON** (immediate dismantling) - The equipment, structures and portions of the facility containing radioactive contaminants are removed and decontaminated to a level that permits release of property and termination of the NRC license.
- **SAFSTOR** (deferred dismantling) – The facility is maintained and monitored in a condition that allows the radioactivity to decay; afterwards the plant is dismantled and property decontaminated.
- **ENTOMB** – Radioactive contaminants are permanently encased on site in structurally sound material such as concrete and the facility is maintained and monitored until radioactivity decays to a level that permits termination of the license.

➤ Decommissioning Methods (Cont.)

- The licensee may decide to adopt a combination of the first two choices (DECON and SAFSTOR)
- Reactor decommissioning actions start 5 years before end of operating license
- Decommissioning must be completed within 60 years of permanent cessation of operations

Decommissioning Funds

- The licensee must establish or obtain a financial mechanism to ensure there will be sufficient funds for ultimate decommissioning of the facility
 - Prepayment, External Sinking Fund, Surety Method, Insurance or other Guarantee Method
- Each nuclear power plant must report to NRC every two years the status of its decommissioning trust fund (DTF)
- Once a plant is within 5 years of permanently ceasing operations, NRC will begin to review the DTF annually
- The report must estimate the minimum amount needed for decommissioning using the formulas in 10 CFR 50.75

Phases of Decommissioning

- **Phase 1. Transition from Operation to Decommissioning**
 - Certificate of permanent cessation of operations
 - Certificate of permanent removal of fuel from reactor
 - Post shutdown decommissioning activity report
- **Phase 2. Major Decommissioning Activities**
 - Permanent removal of major components
 - Owner can use up to 3 percent of funds for decommissioning planning
- **Phase 3. License Termination Activities**
 - Submit a license termination plan for final radiation surveys and updated estimates of remaining decommissioning costs
 - Requires NRC approval of a license amendment and a public meeting
 - NRC issues a letter terminating the operating license

➤ U.S. Reactor Decommissioning Business Model

- Licensee carries out decommissioning activities
- Licensee manages a decommissioning contractor
- Temporary license transfer to a decommissioning company and return the land and spent nuclear fuel to the utility
- Asset sale and license transfer to a non-utility

➤ Reactor Decommissioning Public Involvement

- Post Shutdown Decommissioning Activities Report (PSDAR) meeting
- License Termination Plan (LTP) meeting
- Opportunity for hearing when a licensee submits a License Amendment Request (LAR)
- Opportunity to provide comments whenever the licensee submits a PSDAR, LTP or LAR
- Opportunity to form a Citizens Advisory Panel for decommissioning activities

Current Decommissioning Issues of Public Stakeholders

- Adequacy of decommissioning funding
- Decommissioning strategies: prompt vs. deferred
- Long-term storage of SNF
- Transportation of SNF
- Security of the facility
- Emergency response reductions
- Environmental monitoring

Status of Nuclear Power Plant Decommissioning

- 10 commercial nuclear power plants have been decommissioned in the U.S.
- 11 nuclear power plants are in active decommissioning
- 11 nuclear power plants are in SAFSTOR
- 11 nuclear power plants have announced shutdowns thru 2025

Source: Nuclear Regulatory Commission (as of August 2019)

Independent Spent Fuel Storage Installation

ISFSI

HORIZONTAL



SUSQUEHANNA
(SSES)

VERTICAL



PEACH BOTTOM

ISFSIs in the U.S.

➤ **Spent Nuclear Fuel (SNF) Inventory**

- Approximately 81,518 MTU and increases about 2-2.4K MTU per year

➤ **ISFSI Storage**

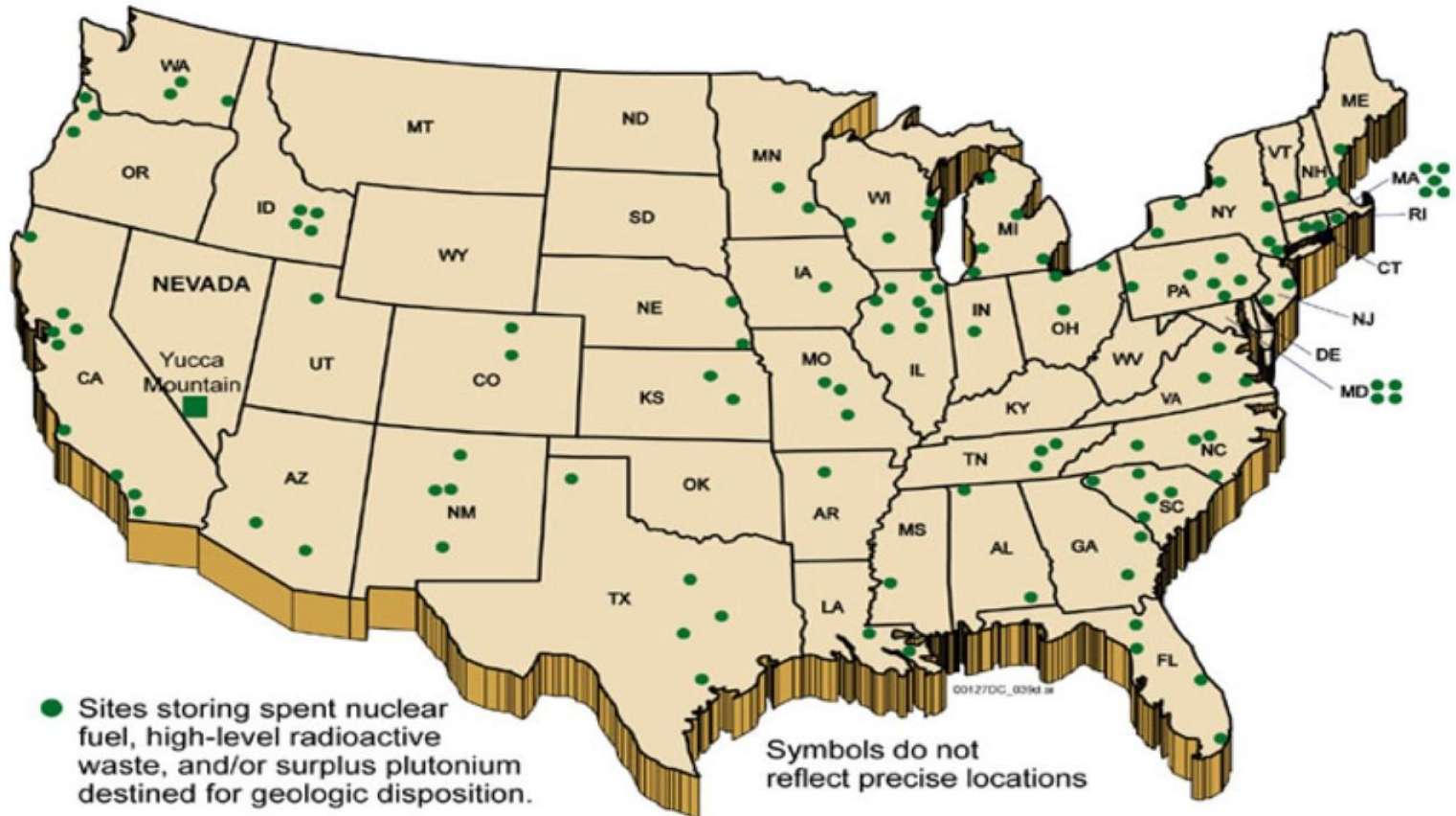
- 130,252 assemblies; 36,696 MTU (45%); 2,966 casks loaded; 72 operating ISFSIs; fuel from 119 reactors

➤ **Long-term commitment to ISFSIs**

- Licenses being extended to 60 years
- License extensions approved at 30 sites
- NRC has found 100 years storage to be safe

Source: Nuclear Energy Institute (as of 12/31/2018)

SNF & HLRW Storage Sites



Estimated LLRW Associated with TMI-1 Decommissioning

<u>Waste Type</u>	<u>Volume (cubic feet)</u>
➤ High Activity Waste	
▪ Class B and C	1,770
▪ Class A	28,152
➤ Low Activity Waste (Class A)	3,373
➤ Very Low Activity Waste (Class A)	316,251

Source: TMI-1 Post Shutdown Decommissioning Activity report



Questions?

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