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Reactor Decommissioning: A look into Emergency Preparedness and Security Requirements

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EMERGENCY PREPAREDNESS



Emergency Preparedness (EP) Requirements

All licensees **are required** to establish emergency plans that provides reasonable assurance that adequate protective measures can and will be taken to protect public health and safety in the event of a radiological emergency.

- 10 CFR 50.47, "Emergency plans"
- 10 CFR 50.47, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities"
- Emergency planning regulations do not distinguish between an operating power reactor and one that is permanently shutdown/defueled.

Focus on Safety

- Licensees must maintain:
 - capabilities to mitigate a potential radiological event
 - an onsite emergency plan providing for the classification of emergencies,
 - notification of offsite government authorities, and
 - coordination of offsite organizations responding onsite (i.e., firefighting, medical assistance, etc.).



Regulatory Approach

- After shutdown, the risks associated with potential accidents is significantly reduced.
 - *To be discussed further in subsequent slide*
- **Historically, exemption requests have been used to seek regulatory relief on a case-by-case basis**
 - Licensees maintain onsite and offsite EP programs and ensures all EP requirements are met, including exercises.
 - The regulatory approach to reduce EP requirements commensurate with the risk is through an exemption process.

Safety Commensurate to Risk

Emergency preparedness requirements are not eliminated but aligned to the risk associated with the spent fuel pool, rather than an operating power reactor.



Regulatory Approach (cont.)

- Exemption process (10 CFR 50.12) applies to licensees seeking regulatory relief
 - *Needs to “comply with / meet” a regulation vs. license amendment process (alternate method to comply with regulation.)*
 - Application of regulations may not be necessary to achieve the underlying purpose. *(all or partially)*
 - An Exemption to EP regulations contained in 10 CFR 50.47(b) and Appendix E to Part 50 requires Commission approval
- (Staff Requirements Memorandum (SRM) to SECY-08-0024)*

Regulatory Approach (cont.)

If an exemption is granted:

- Permanently Defueled Emergency Plan (PDEP)
 - Contains program elements similar to an Independent Spent Fuel Storage Installation (ISFSI)
- Emergency Action Level Scheme (permanently defueled)
 - For events that could affect the safe storage of spent fuel, either in the spent fuel pool (SFP) or dry storage

Exemption Considerations

- Traditional accidents that dominate operating plant risk are no longer applicable after a reactor is defueled.
 - Risk to public is primarily associated with the spent fuel stored in the SFP
- Short-term radioisotopes no longer of concern (radioiodine)
 - Distribution of potassium iodide (KI) is not necessary
- SFP accident would evolve slowly
 - Provides adequate time to initiate mitigation measures, or if necessary, protective actions.

Spent Fuel Pool Studies

Spent fuel pools are robust structures that provide reasonable assurance to protect the public health and safety.

- Proposed Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning (SECY-00-145), June 28, 2000
 - NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," Feb. 2001
- Informed by recent SFP Studies
 - NUREG-2161, "Consequence Study of a Beyond Design Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor," September 2014

Operating vs Decommissioning

<u>Operating Reactor(s)</u>	<u>Decommissioning Site</u>
Focused on response to variety of emergencies related to an operating reactor.	Focused on SFP/IFSI events (permanently shutdown/defueled reactor)
<ul style="list-style-type: none">• Formal offsite REP plans<ul style="list-style-type: none">○ EPZ / Alert and Notification System (ANS) Sirens	<ul style="list-style-type: none">• Comprehensive (“all hazards”) planning<ul style="list-style-type: none">○ Coordination with firefighting, medical, etc. responding onsite
<ul style="list-style-type: none">• Event Classification<ul style="list-style-type: none">○ NOUE → General Emergency	<ul style="list-style-type: none">• Event Classification<ul style="list-style-type: none">○ NOUE → ALERT
<ul style="list-style-type: none">• Notification of event classification<ul style="list-style-type: none">○ 15 min. (State/local counties)	<ul style="list-style-type: none">• Notification of event classification<ul style="list-style-type: none">○ “Prompt” (designated agencies)
<ul style="list-style-type: none">• Dedicated on- & off-site facilities	<ul style="list-style-type: none">• Onsite “Command Center”
<ul style="list-style-type: none">• Joint, on- and off-site biennial exercises	<ul style="list-style-type: none">• Onsite biennial exercise<ul style="list-style-type: none">○ Offsite response organizations invited to participate in exercises

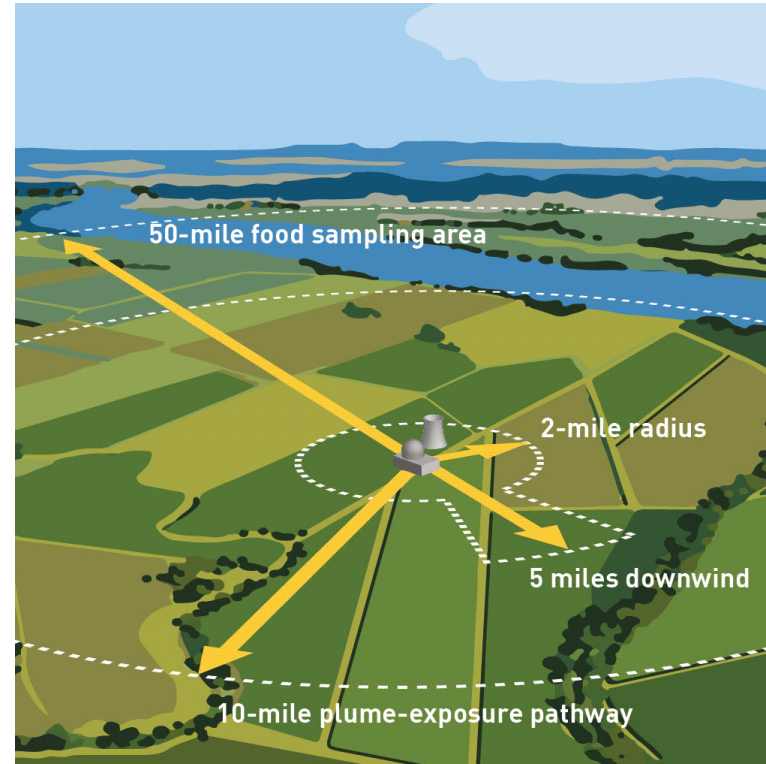
Past exemptions were based on risks at the site which established EP requirements similar to those for an Independent Spent Fuel Storage Installation (ISFSI)

Emergency Planning Zones (EPZ)
Notification of Unusual Event (NOUE)

Emergency Planning Zone

EPZs are planning tools to aid implementing pre-determined, prompt protective action.

During decommissioning sufficient time is available to mitigate the accident or initiate protective actions as conditions warrant without the aid of an EPZ.





Emergency Planning Zones



Exemptions

- Recent EP Exemptions
 - Kewaunee
 - Crystal River
 - Fort Calhoun
 - Oyster Creek
 - Duane Arnold
 - San Onofre
 - Vermont Yankee
 - Pilgrim
 - Three Mile Island

Doug Garner, Security Specialist
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SECURITY

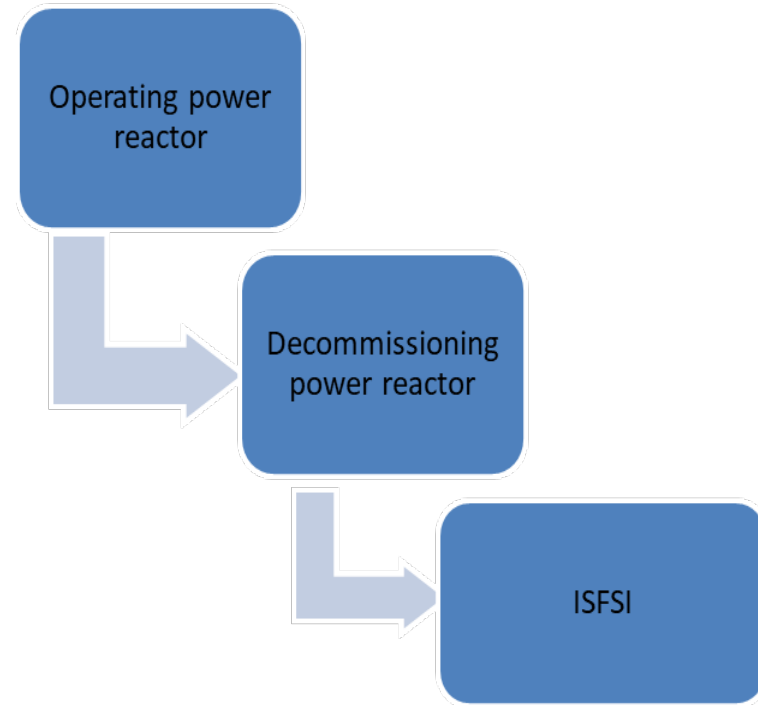
Physical Security Requirements

Similar to emergency preparedness, all licensees **are required** to establish security plans which provide reasonable assurance that adequate protective measures can and will be taken to protect public health and safety.

- 10 CFR 73.55, "Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage"
- NRC Security Orders
- Physical security regulations do not distinguish between an operating power reactor and one that is permanently shutdown/defueled.

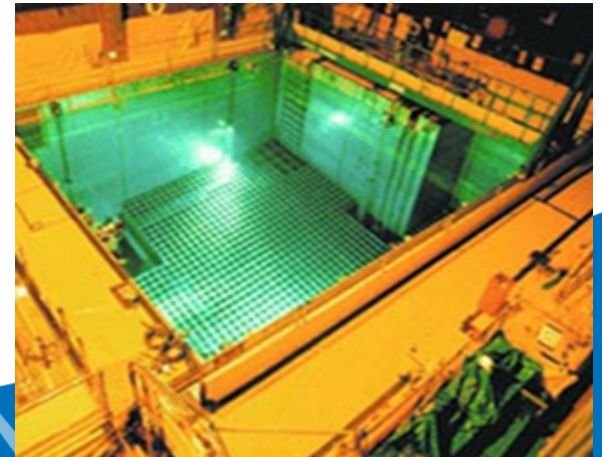
Regulatory Approach

- Licensee notifies the NRC of permanently ceased operations in accordance with 50.82(a)(1)(i) and has certified permanent removal of fuel from the reactor vessel under 50.82(a)(1)(ii).
- Title 10 of the Code of Federal Regulations Part 73, Section 73.55 and the NRC Security Orders still apply.
- Protective strategy remains the same as an operating reactor while fuel remains in the SFP.
- Fuel is moved to and stored onsite at the ISFSI when appropriate conditions are met.



Physical Protection Requirements

- The scope of physical security protections are based on the safety function(s) that remain and must be protected.
- The Licensee is required to maintain a security force on site equal to the threat to the spent fuel.
- The Licensee can request licensing actions or exemptions to modify the physical security program for the protection of spent fuel.
- The NRC will continue to conduct inspections ensuring physical security requirements are met, including inspections to evaluate changes to the security posture.



Cyber Security Protection

- The cyber security protections are gradually reduced as safety, security and EP systems are removed from service.
- The cyber security rule, 10 CFR 73.54, is no longer applicable after the certification letter submittal. However, the cyber security license condition remains in place.
- The Licensee may submit a license amendment request to remove the cyber security license condition after the fuel is moved to the SFP and sufficiently cooled.



ISFSI Protection

- The Licensee must provide protection for the ISFSI until all fuel is removed from the site.
- NRC approved Physical Security Plan and post 9-11 NRC Orders enhance ISFSI security.
- There are no cyber security regulatory requirements for the ISFSI.

Overall Inspection Program

- Continuous and routine inspection program
- Inspection Program starts at construction and will remain until the license is terminated
- NRC will continue to conduct inspections to ensure physical security requirements are met, including inspections to evaluate changes to the security posture.
- NRC performs ISFSI inspections periodically to ensure that the ISFSI security plan requirements continue to be met.

Summary

- Security and EP requirements are not being eliminated but aligned to the risk to the public.
- Physical and cyber security requirements may be reduced as safety systems are removed from service.
- Licensees must maintain an onsite emergency plan providing for the classification of emergencies, notification of offsite government authorities, and coordination of offsite organizations responding onsite.
- Physical security requirements remain in place for the SFP and the ISFSI commensurate with the risk.
- NRC will continue to provide independent oversight and inspections through license termination.

Thank You



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