Region VII RAC Meeting
September 21, 2016

"Recent Experience in Evaluating Reductions in Emergency Preparedness Requirements for Decommissioning Nuclear Power Plants"

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Recent U.S. Decommissionings

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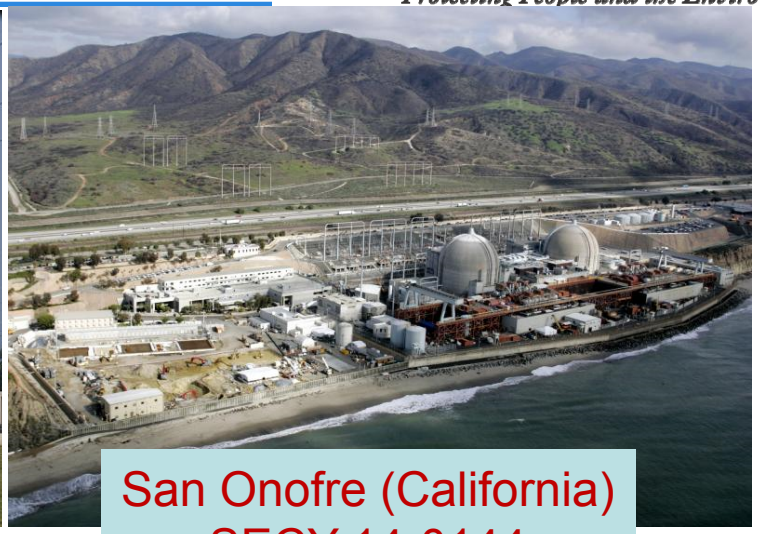
Kewaunee (Wisconsin)
SECY-14-0066



San Onofre (California)
SECY-14-0144

Vermont Yankee (Vermont)
SECY-14-0125

Crystal River 3 (Florida)
SECY-14-0118

Projected Decommissionings

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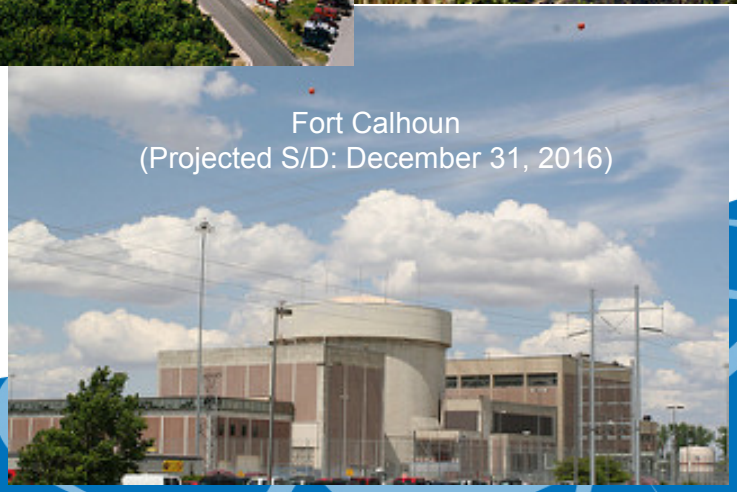
Clinton
(Projected S/D: June 1, 2017)

Pilgrim
(Projected S/D: May 1, 2019)

Oyster Creek
(Projected S/D: December 31, 2019)

Quad Cities
(Projected S/D: June 1, 2018)



Fort Calhoun
(Projected S/D: December 31, 2016)

Integrated Decommissioning Rulemaking

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- SRM to SECY-14-0066 (August 7, 2014)

  …"the staff should report to the Commission in January 2015 its views on the need for an integrated rulemaking for decommissioning and, as appropriate, provide the potential schedule and resources required for completion."

- SRM to SECY-14-0118 (December 30, 2014)

  – Provided further direction to staff on rulemaking; however,

  "The staff should continue to review other exemption requests, already in process, and provide timely recommendations to the Commission."

EP Decommissioning Submittals

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- [License Amendment] Post-Shutdown Emergency Plan
  - Seeking reduction in licensee ERO staffing and EALs under existing EP regulations ("pre-exemption")
- [License Exemption] Reduction in EP requirements
  - [License Amendment] Permanently Defueled Emergency Plan
  - [License Amendment] Permanently Defueled EAL scheme
- [License Amendment] ISFSI Only Emergency Plan
  - Seeking further reductions in licensee ERO staffing and EALs under EP regulations, as exempted.

Regulatory Process

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- USNRC regulations for emergency planning (EP) do not distinguish between an operating power reactor and one that is permanently shutdown/defueled
- After shutdown, the risks associated with potential accidents is significantly reduced
  - Consideration given to reduce offsite EP measures commensurate with the hazard of spent fuel storage
- Historically, exemption requests have been used to seek regulatory relief on a case-by-case basis
  - Application of regulations may not be necessary to achieve the underlying purpose.

Accident Considerations

- After a reactor is defueled, the traditional accidents that dominate operating plant risk are no longer applicable
  - Risk to public is primarily associated with the spent fuel stored in the Spent Fuel Pool (SFP)
- Short-term radioisotopes no longer of concern (radioiodine)
  - Distribution of potassium iodide (KI) is not necessary
- SFP accident would evolve slowly versus accident at an operating reactor
  - Provides adequate time to initiate mitigation measures.

Permanently Shutdown / Defueled

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- 10 CFR 50.82(1)
  - Written certifications that licensee has determined to permanently cease operations and once fuel has been permanently removed from reactor vessel
- Post-Shutdown Emergency Plan (LAR)
  - Reduction in licensee ERO staffing (evaluated to determine potential impact on existing offsite REP plans)
  - System Malfunction (power operations) and fission product barrier EALs no longer applicable
- Emergency Response Data System (ERDS)
  - No longer required under Appendix E to 10 CFR Part 50

EP Exemption Considerations

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- Past EP Exemptions
- 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," February 2001
    http://pbadupws.nrc.gov/docs/ML0104/ML010430066.pdf
- 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
    http://pbadupws.nrc.gov/docs/ML1425/ML14255A365.pdf

Exemption Precedent

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Licensee site-specific SFP analyses demonstrate that:

- Applicable Design Basis Accident(s) would not result in projected doses to public exceeding U.S. Environmental Protection Agency (EPA) protective action guides;

AND

- Spent fuel is not susceptible to a zirconium fire or sufficient time would be available to take mitigation measures, and if needed, implement offsite protective measures
  - **Beyond Design Basis Event (loss of all cooling)**
  - "all hazards" basis (National Preparedness System)

Exemption Criteria

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- Examples of applicable Design Basis Accident(s):
  - Radioactive waste system leak or failure
  - Spent fuel cask drop accident
  - Fuel handling accident
- Examples of SFP accidents considered:
  - Loss of SFP normal cooling
  - Complete loss of SFP water inventory with air cooling
  - Complete loss of SFP water inventory with no air cooling

Exemption Criteria

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Sufficient time available to take mitigation measures:

- Minimum of 10 hours
  - T+0: Time **ALL** cooling is lost
  - T+≤10 hours: 900°C (potential spent fuel fire)
- Conservatively does not consider time from initiating event to point where loss of all SFP cooling occurs
- Historically takes 15-20 months from time of shutdown to meet this criterion

Exemption Criteria

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- Capability to take prompt SFP mitigation measures:
  - Identified SFP mitigation strategy(ies)
  - Availability of “on-shift” staffing and equipment to promptly initiate

Exemption Evaluation

- Interim Staff Guidance NSIR/DPR-ISG-02, "Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants"

http://pbadupws.nrc.gov/docs/ML1410/ML14106A057.pdf

  – Incorporated into EP guidance associated with Decommissioning Rulemaking.

Exemption Precedent

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Past exemptions reduced EP requirements similar to that for dry cask storage of spent fuel.

Operating Reactor(s)	Decommissioning Site
Focused on response to variety of emergencies related to an operating reactor.	Focused on SFP events (permanently shutdown/defueled reactor)
• Formal offsite REP plans o EPZ / Alert and Notification System (ANS)	• Comprehensive ("all hazards") planning o Coordination with firefighting, medical, etc. responding onsite
• Event Classification o Unusual Event → General Emergency	• Event Classification o Unusual Event → Alert
• Notification of event classification o 15 min. (State/local counties)	• Notification of event classification o "Prompt" (designated agencies)
• Dedicated on- & off-site facilities	• Onsite "Command Center"
• Joint, biennial exercises	• Onsite biennial exercise o Offsite response organizations invited to participate in exercises

Key Messages

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- Exemptions to EP requirements determined to be a reduction in effectiveness, must be approved by Commission.
- Exemptions approved on a license-specific basis.

NRC Contacts

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Thank You

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