# Considerations on the Development and Submittal of an Exemption to Certain Standards of 10 CFR 50.47 and Requirements of Appendix E to 10 CFR Part 50

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# *Objectives*

- The scope and technical basis for EP exemption considerations as outlined in Table 1 of the ISG, including hostile action aspects;
- The applicable design basis accident (DBA) and beyond DBA analyses required to support evaluation of EP exemption as outlined in the ISG;
- Expectations for maintaining the capability to promptly implement Spent Fuel Pool (SFP) mitigation strategies and on-shift staffing to support prompt implementation, if needed; and
- Requirement for and process for obtaining Commission approval of a proposed EP LAR.

# *Regulatory Basis*

- Regulations are directed toward operating facilities
  - Do NOT address EP requirements for plants that are permanently shutdown and defueled.
- Exemptions to regulations grant regulatory relief on a case-by-case basis
- Licensee shall comply with regulations until an exemption is granted
  - Licensee shall maintain the effectiveness of an emergency plan that meets the requirements in appendix E and the planning standards of § 50.47(b).

# *Regulatory Basis*

- Why not a License Amendment?
  - 10 CFR 50.90 (amendment) applies to licensees seeking to change their license conditions in how they comply with regulations
  - 10 CFR 50.54(q)(4) requires a licensee to submit a license amendment for emergency plan changes that reduce the effectiveness of the plan
- 10 CFR 50.12 (exemption) applies to licensees seeking regulatory relief – no longer needs to comply with regulation

# *Exemptions*

- Eliminates emergency planning zones
  - No prompt alert and notification systems
  - No evacuation time estimates
  - No periodic public information
  - No potassium iodide
  - No offsite preplanned protective actions
  - No 15 minute notification time requirement
- Emergency classifications
  - Limited to Unusual Event and Alert levels
  - No 15 minute classification time requirement

# *Exemptions*

- Facilities
  - No Emergency Operations Facility
  - No Technical Support Center
  - No Operational Support Center
  - No alternate facility
- Emergency exercises
  - No offsite participation biennial exercise
  - No submittal of exercise scenarios
  - No eight year exercise cycle requirements
  - No wide spectrum of events including hostile action requirement

# *Exemptions*

- Hostile action requirements
  - No alternate facility
  - No hostile action exercise
  - No onsite protective actions for hostile action
  - Some EP requirements for security-based events are maintained
    - Security EALs are maintained

# *Accident Considerations*

- After reactor 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)
- Risk of a SFP accident is lower than accident risk in an operating plant
  - SFP at atmospheric pressure
  - Fuel is subcritical
  - Heat source is low

# *Accident Considerations*

- Risk of SFP accident dominated by beyond design basis earthquake
  - Assuming certain storage configuration and heat decay times, spent fuel assemblies could heat up if SFP water inventory is lost
  - Beyond design basis earthquake would challenge SFP liner integrity
  - Possible oxidation of fuel cladding becomes self-sustaining ("zirconium fire")
- SFP accidents consequences:
  - Dominated by long-lived radionuclides (Cs-137 / Sr-90), vs. short-term radionuclides for operating NPP
  - Risk of immediate life threatening doses is considered very low

# *Accident Analyses*

- Applicable DBAs
  - fuel handling accident in the fuel handling building,
  - a SFP boiling accident,
  - a liquid radioactive waste system leak or failure,
  - a radioactive release due to liquid tank failures,
  - an accidental release of waste gas, and
  - a spent fuel cask drop accident (if the cask handling system is not licensed as single-failure-proof).

# *Accident Analyses*

- Complete loss of SFP water inventory with no heat loss (adiabatic heat up)
  - Demonstrating a minimum of 10 hours is available before any fuel cladding temperature reaches 900 degrees  Celsius from the time all cooling is lost.
- Loss of SFP water inventory resulting in radiation exposure at the Exclusion Area Boundary and control room.

# *Accident Analyses*

- Considering the site-specific seismic hazard, either:
  - an evaluation demonstrating a high confidence of a low-probability (less than 1 x 10-5 per year) of seismic failure of the SFP structure, or
  - an *analysis demonstrating the fuel has decayed sufficiently that natural air flow in a completely drained pool would maintain peak cladding temperature below 565 degrees Celsius (the point of incipient cladding damage).

*If a seismic reevaluation as part of the 10 CFR 50.54(f) request under NTTF Item 2.1 was completed, then there is no need to perform an air cooling evaluation, only the adiabatic heat-up analysis.

# *Spent Fuel Pool Mitigation*

## 10 CFR 50.54(hh)

(2) Each licensee shall develop and implement guidance and strategies intended to maintain or restore core cooling, containment, and **spent fuel pool cooling capabilities** under the circumstances associated with loss of large areas of the plant due to explosions or fire, to include strategies in the following areas:

(i) Fire fighting;

(ii) Operations to mitigate fuel damage; and

(iii) Actions to minimize radiological release.

# *Spent Fuel Pool Mitigation*

10 CFR 50.54(hh)

(3) This section does not apply to a nuclear power plant for which the certifications required under § 50.82(a) or § 52.110(a)(1) of this chapter have been submitted.

# *Spent Fuel Pool Mitigation*

The Statements of Consideration for the final rule (74 *Federal Register* 13933; March 27, 2009) provided:

- The commenter indicated that it is inappropriate that §50.54(hh) should apply to a permanently shutdown and defueled reactor where the fuel was removed from the site or *moved to an independent spent fuel storage installation (ISFSI).* **The NRC agrees with this comment and revised the final requirements in §50.54(hh) so they do not apply to facilities for which certifications have been filed under § 50.82(a)(1)** or § 52.110(a)(1).

# *Spent Fuel Pool Mitigation*

- Licensees are required to maintain the mitigation strategies license condition
  - Adequate trained personnel onshift
  - Adequate equipment available
    - If more than one SFP, personnel and equipment are available to respond to each pool
  - Procedures in place

# *Exemption Request Process*

- Historically, approval of EP exemption requests are 12 to 18 months in duration
  - Request submitted
  - Adequacy review
  - Technical evaluation
  - Commission Paper
  - Preparation of Exemption Approval Package
  - Concurrence
  - Exemption issued
    - Package to Licensee
    - Federal Register

# *Exemption Request*

The 10 CFR 50.12, "Specific exemptions," provisions with respect to the requested exemptions

- 10 CFR 50.12 (a)(1): Authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security
- 10 CFR 50.12 (a)(2): The Commission will not consider granting an exemption unless special circumstances are present. Special circumstances are present whenever –
  - 10 CFR 50.12 (a)(2)(ii): Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule
  - 10 CFR 50.12 (a)(2)(iii): Compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated

# *Exemption Request*

- Accident analyses provided as discussed previously.
- NSIR/DPR-ISG-2 Table 1 “Exemptions for Consideration”
  - Table of strikeout language included
  - Site-specific basis for each exemption
  - Only strikeout of rule language, no modification allowed (e.g., A licensee shall have the capability to notify responsible State and local governmental agencies ~~within 15 minutes~~ after declaring an emergency)

# *Exemption Request*

- NUREG-1738 – Industry Decommissioning Commitments and Staff Decommissioning Assumptions are addressed
- SFP mitigation strategies are described
  - Sufficient resources and adequately trained personnel available on-shift to initiate mitigative actions within two hours
  - Mitigation strategies are consistent with that required by the Permanently Defueled Technical Specifications or by retained license conditions