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NRC Meeting: Emergency Preparedness



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Presented By: Justin Hawkins

SMR, LLC, A Holtec International Company
Krishna P. Singh Technology Campus
One Holtec Boulevard
Camden, NJ 08104, USA

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Meeting Agenda



- Introductions
- Purpose & Outcome
- Regulations
- Guidance
- CPA/PSAR EP Content
- Overview of SMR-160 EP Program
- SMR-160 Approach for Setting an EPZ Size
- EPZ Questions and Definitions
- Additional EP Discussion Topics / Questions
- Open Forum

Introductions



- NRC Staff

- Holtec Staff

Purpose and Outcome

■ Purpose

To provide a high-level overview of the SMR-160 EP/EPZ approach

■ Outcome

To obtain feedback from the NRC staff on discussed EP/EPZ approach

Regulations



- Appendix E to 10 CFR Part 50, “Emergency Planning and Preparedness for Production and Utilization Facilities”
- 10 CFR 50.47, “Emergency plans”
- 10 CFR 50.54, “Conditions of licenses”
- 10 CFR 50.34, “Contents of applications technical information”
- 10 CFR 100, “Reactor Site Criteria”

Guidance



- Section 13.3 of NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition” (NUREG-0800)
- Section 13.3 of Regulatory Guide 1.70, “Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)”
- NUREG-0396, -0654, and -0696

Guidance (Cont.)



- DG-1350, “Performance-Based Emergency Preparedness for Small Modular Reactors, Non-Light-Water Reactors, and Non-Power Production or Utilization Facilities”
- DG-1389, “Alternative Radiological Source Terms for Evaluating Design Basis Accidents at NPPs”
- NEI 99-01, Revision 6, “Development of Emergency Action Levels for Non-Passive Reactors”

Questions for NRC Staff:

- Would the SMR-160 EALs be required in the CPA?
- NEI 99-01 is not for SMRs. NEI 07-01, “Methodology for Development of Emergency Action Levels Advanced Passive Light Water Reactors (2009),” is not specifically for SMRs. Is there guidance that can be used to develop SMR EALs?

Guidance (Cont.)



- RG 4.7, Revision 3, “General Site Suitability Criteria for Nuclear Power Stations”
- NUREG-0396, “Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants, 1978”

Question for NRC Staff:

- **What is the timeline for the proposed revision to RG 4.7?**
- **Are there additional EP guidance documents that should be considered for SMRs?**

CPA / PSAR EP Content



5-3-23 SMR-160 Design Overview - NRC Staff: *“In accordance with 10 CFR 50.34(a)(10), will the applicant be including in the PSAR a discussion of the applicant’s preliminary plans for coping with emergencies, which include the applicable items in Appendix E to 10 CFR Part 50, as well as the means by which the standards of 10 CFR 50.47(b) will be met?”*

Preliminary plans will be summarized in the PSAR per 10CFR50 App E:

- sufficient information of proposed emergency plans (onsite and in EPZ), facility design features, site layout & location of access routes, population distributions, land use, and EP boundaries
- onsite and offsite organizations; notifications for coping with emergencies
- contacts/arrangements made with local, State, and Federal agencies
- protective measures to be taken within the site boundary and within each EPZ; response times
- provisions for emergency treatment of individuals at onsite and offsite facilities; and transportation
- provisions for an EP training program
- preliminary analysis of notification times and evacuation times
- preliminary analysis for identifying the scope of radiological consequences of emergency situations within and outside the site boundary; dose projection using real-time meteorological information; radiological monitoring; role of TSC and EOF teams

CPA / PSAR EP Content



■ NUREG 0800 SRP 13.3

✓ Provide evidence of preliminary EP planning in PSAR

- Discuss preliminary plans for coping with emergencies [include all elements in App E and 50.47(b) – summarized on previous slide]
- CFR 50.34(a), footnote 5, allows an applicant for a CP to provide required information in the form of a discussion, with specific references, of similarities to and differences from, facilities of similar design for which applications have previously been filed with the Commission

Overview of EP Program



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Questions for NRC Staff:

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Overview of EP Program



- SMR plans to follow the proposed “Emergency Preparedness for Small Modular Reactors and Other New Technologies” (50.160) for both EPZ sizing and program description.
- If the rule is not finalized prior to the SMR-160 CPA, the existing exemption processes will be used.

- **Question for NRC Staff:**
 - **Does the staff believe that this is an acceptable path forward?**
 - **Does the staff see any concerns with this approach based on our projected timelines to date?**

SMR-160 Understanding of Performance-Based EP



- The new proposed EP requirements and guidance would adopt a scalable plume exposure pathway emergency planning zone (EPZ) approach and address ingestion response planning. The new alternative EP requirements and guidance would:
 - ✓ Continue to provide reasonable assurance that adequate protective measures can and will be implemented by an SMR licensee;
 - ✓ Promote regulatory stability, predictability, and clarity;
 - ✓ Reduce requests for exemptions from EP requirements;
 - ✓ Recognize advances in design and technological advancements embedded in design features;
 - ✓ Credit safety enhancements in evolutionary and passive systems; and
 - ✓ Credit smaller sized reactors' and non-LWRs' potential benefits associated with postulated accidents, including slower transient response times, and relatively small and slow release of fission products.

SMR Approach for Setting an EPZ Size



■ The SMR EPZ goals are:

- ✓ Ensure EPZ methodology is applicable to any SMR-160 site location

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SMR Approach for Setting an EPZ Size (cont.)



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Question for the NRC Staff:

- Does the NRC have any concerns with this planned approach?
- Does the NRC have any concerns with application of Draft Guidance (DG-1350 and DG-1389)?

SMR Approach for Setting an EPZ Size (cont.)



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■ Question for the NRC Staff:

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- ✓ How are 'release points' set for multiple containments? (Do we evaluate individually and then draw boundaries taking most conservative distances?)

EPZ Question



- ISG-2022-01 “Review of Risk-Informed, Technology-Inclusive Advanced Reactor Applications—Roadmap – May 2023” (ML24048B546) Appendix B page 4 states, “For exemption requests of this nature, applicants should provide a consequence- and risk-oriented justification, including a quantitative assessment of the dose at the proposed emergency planning zone boundary. See 85 FR 28436 (describing the performance-based approach in the proposed rule “Emergency Preparedness for Small Modular Reactors and Other New Technologies.”)”

- Questions for NRC staff:
 - Can staff provide a clarification on what is meant by “consequence- and risk-oriented justification?”

EP Boundary Definitions



Site Boundary – line beyond which the property is not owned, leased, or otherwise controlled by the licensee (10CFR20.1003). Includes the owner-controlled area (OCA), protected area (PA), vital areas and material access areas.

Exclusion Area Boundary (EAB) – area where the licensee has the authority to determine activities (exclusion or removal; may include highways, rail and water). Homes are not normally permitted (10CFR50.2 and 10CFR100.3). *(10CFR100.11 - an individual located at any point on its boundary for 2 hours immediately following onset of the postulated fission product release would not receive a total radiation dose to the whole body in excess of 25 rem or a total radiation dose in excess of 300 rem to the thyroid from iodine exposure)*

Low Population Zone (LPZ) - area immediately surrounding the EAB which contains residents, the total number and density of which are such that there is a reasonable probability that appropriate protective measures could be taken in their behalf in the event of a serious accident (no specific #'s as they will be site specific)(10CFR100.3). *(10CFR100.11 - an individual located at any point on its outer boundary who is exposed to the radioactive cloud resulting from the postulated fission product release (during the entire period of its passage) would not receive a total radiation dose to the whole body in excess of 25 rem or a total radiation dose in excess of 300 rem to the thyroid from iodine exposure)*

Population Center Distance (PCD) – for Population Density See RG 4.7. *(10CFR100.11 - A population center distance of at least one and one-third times the distance from the reactor to the outer boundary of the low population zone. In applying this guide, the boundary of the population center shall be determined upon consideration of population distribution.**

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Plume Exposure Pathway EPZ (EPZ) - extending 10 miles in radius around the reactor site. Protective action plans within this area are designed to avoid or reduce dose from potential exposures such as inhaling radioactive particles. These actions include sheltering, evacuation, and the use of potassium iodide pills where appropriate. *Under 10CFR50.160, EPZ is the area within which public dose is projected to exceed 10 millisieverts (1 rem) TEDE over the first 96 hours from the release of radioactive materials from the facility, considering accident likelihood and source term, timing of the accident sequence, and meteorology. In addition, the plume exposure pathway EPZ is the area in which predetermined, prompt protective measures are necessary.*

Ingestion Exposure Pathway EPZ (IPZ) - 50 miles in radius around the reactor site. Protective action plans for this area are designed to avoid or reduce dose from eating or drinking radioactive materials. *IPZ not required for SMRs complying with 50.160.*

NRC regulations allow the determination of the size of the EABs and LPZs to be based on estimated offsite radiological consequences and do not establish minimum allowable distances.

* SECY-SRM-20-0045 revising the population-related siting guidance, RG 4.7. NRC Pursuing Option 3.

EP Boundary Definitions (Cont'd)

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[[Potential EP Facilities



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Additional EP Discussion Topics / Questions



- Evacuation timelines pre-construction, during construction, and post-construction
- EP pre-construction, during construction, and post-construction

Open Forum

