



Exemption Request to Utilize 50.160 EP Rule

March 19, 2025

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Meeting Agenda

- Introductions
- Purpose & Outcome
- Background
- Exemption Sought
- Technical Justification of Exemption
- Regulatory Basis
- Supporting Discussion

Purpose & Outcome

■ Purpose:

- ✔ Provide overview of SMR, LLC request for exemption to permit the SMR-300 to utilize 10 CFR 50.160
Emergency preparedness for small modular reactors, non-light water reactors, and non-power production or utilization facilities

■ Outcome:

- ✔ Gain clarity on available exemption request pathways
- ✔ Ensure NRC understanding of the forthcoming exemption request and address any initial questions

Background

- 10 CFR 50.47 and Appendix E to 10 CFR 50 provide deterministic EP framework for large LWRs
- 10 CFR 50.160 provides alternative performance-based EP framework for *small modular reactors*
 - ✓ The same federal action added the 10 CFR 50.2 definition of *small modular reactor* to be used with 10 CFR 50.160

Background

- Applicants and licensees are required to address EP
 - ✓ CP applicants: 50.34(a)(10)
 - ✓ OL applicants: 50.33(g), 50.34(b)(6)(v)
 - ✓ OL holders: 50.54(q)
- Requirements limit use of 50.160 to *small modular reactors*
 - ✓ 10 CFR 50.2 limits *small modular reactors* to 1,000 MWt
 - ✓ SMR-300 is designed to produce 1,050 MWt
 - ✓ SMR-300 is not considered a *small modular reactor* for the purposes of EP

Exemption Sought

- SMR, LLC is considering multiple options:
 1. Request an exemption from 50.2
(definition of *small modular reactor*)
 2. Request an exemption from 50.33, 50.34, and 50.54
 3. Request exemptions from specific aspects of 50.47 and 10 CFR 50 Appendix E
- Result if approved:
 - ✓ SMR-300 would be able to use 50.160 for EP in lieu of Appendix E

Regulatory Basis – 10 CFR 50.12(a)(1)

The requested exemption:

- Is authorized by law
 - ✓ Not inconsistent with the Atomic Energy Act of 1954, as amended
- Does not present an undue risk to the public health and safety
 - ✓ SMR-300 design utilizes enhanced passive safety features and produces relatively low power
 - ✓ 10 CFR 50.160 is performance-based and technology-inclusive, resulting EP is commensurate with SMR-300 design
- Is consistent with the common defense and security
 - ✓ No impact on plant security or safeguards procedures

Options 1 and 2: Exemption to 50.2 or 50.34(a)(10)

- Regulatory Basis – 10 CFR 50.12(a)(2)
- Special circumstance - 10 CFR 50.12(a)(2)(ii)
Application of the regulation is not necessary to achieve the underlying purpose of the rule
- Both options seek to allow use of 50.160
 - ✓ Underlying purpose of 10 CFR 50.160 identified in six NRC objectives outlined in SECY-18-0103 and 88 FR 80050

Technical Justification – Underlying Purpose of 50.160



- Objective of the 10 CFR 50.160 rule (SECY-18-0103, 88 FR 80050): create alternative emergency preparedness requirements that:
 - 1) continue to provide reasonable assurance that adequate protective measures can and will be implemented by an SMR or ONT licensee;
 - 2) promote regulatory stability, predictability, and clarity;
 - 3) reduce requests for exemptions from EP requirements;
 - 4) recognize technology advancements embedded in design features;
 - 5) credit safety enhancements in evolutionary and passive systems; and,
 - 6) 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.

Technical Justification – Underlying Purpose of 50.160

- NRC objectives relevant to new designs:
 - 4) recognize technology advancements embedded in design features;
 - 5) credit safety enhancements in evolutionary and passive systems; and,
 - 6) 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-300 design includes:
 - ✓ Enhanced passive safety features - no reliance on pumps, external water, or offsite power
 - ✓ Ability to achieve safe shutdown without reliance on operator actions
 - ✓ Reduced core damage frequency and large release frequency compared to large LWR fleet
 - ✓ Smaller source term and decreased dose consequences of postulated accidents compared to large LWR fleet

Summary – Underlying Purpose of 10 CFR 50.160



| Underlying Purpose | SMR-300 Planned Approach |
|--|--|
| Reasonable assurance of adequate protective measures | Follow 50.160: performance-based, risk-informed, technology-agnostic EP will be commensurate with risk |
| Regulatory stability | No change to treatment of large LWRs No impact on future applicants |
| Reduce requests for exemptions | Avoid alternative – multiple exemptions from EP rules |
| Recognize technology advancements | Passive safety systems, no reliance on offsite power or water Design and operation will reflect industry OE and lessons learned |
| Credit safety enhancements | Reduced CDF and LRF compared to current fleet |
| Credit potential benefits associated with postulated accidents | Smaller core reduces dose from postulated releases |

Option 1: Exemption to 50.2

■ 50.2 *Definitions* states, in part:

- ✓ *Small modular reactor* means a power reactor, which may be of modular design as defined in § 52.1 of this chapter, licensed under § 50.21 or § 50.22 to produce heat energy up to 1,000 megawatts-thermal per module

Option 1: Exemption to 50.2

- Underlying purpose of 50.2 definition of *small modular reactor* discussed in 88 FR 80050 (November 2023)
 - ✓ Differentiate between new, smaller reactors and large LWRs for EP
 - ✓ Maintain consistency with 10 CFR 171.5 definition
 - 10 CFR 171.5 definition of *small modular reactor* was based on anticipated design characteristics from the mid 2010s (81 FR 32617)

Summary – Underlying Purpose of 50.2



| Underlying Purpose | SMR-300 Planned Approach |
|---|---|
| Exclude large LWRs from the definition to facilitate use of 10 CFR 50.160 | SMR-300 intends to utilize 10 CFR 50.160; Risk profile is significantly different than current large LWRs due to smaller size coupled with safety improvements |
| Maintain consistency with 10 CFR 171.5 definition of <i>small modular reactor</i> | SMR-300 is not proposing an exemption to 10 CFR 171.5 |

Option 2: Exemption to 50.33, 50.34, and 50.54

■ 10 CFR 50.34 (a) *Preliminary safety analysis report.*

Each application for a construction permit shall include a preliminary safety analysis report. The minimum information to be included shall consist of the following: ...

(10) A discussion of the applicant's preliminary plans for coping with emergencies based on:

(i) Except as provided in paragraph (a)(10)(ii) of this section, the requirements in appendix E to this part.

(ii) For a small modular reactor, a non-light-water reactor, or non-power production or utilization facility construction permit applicant, the requirements in either § 50.160 or appendix E to this part.

Option 2: Exemption to 50.33, 50.34, and 50.54

- Request partial exemption to item (ii):
(ii) For a ~~small modular reactor, a non-light-water reactor, or non-power production or utilization facility~~ construction permit applicant, the requirements in either § 50.160 or appendix E to this part.

- Exempt SMR-300 from limitation on item (ii)
 - ✔ SMR-300 will comply with remainder of item (ii)
- No need for exemption to (10)(i) if complying with (10)(ii)

Option 2: Exemption to 50.33, 50.34, and 50.54

- Changes to 50.33, 50.34, and 50.54 are discussed in 88 FR 80050 (50.160 rulemaking, November 2023)
 - ✓ Consistent underlying purpose for all regulations in Option 2
- 50.34(a)(10), 50.34(b)(6)(v), and 50.54(q)
 - ✓ Requirements merely implement 50.160
- 50.33(g)(2) also includes requirements for EPZ size determination
 - ✓ Underlying purpose is consistent with that of 50.160

Option 2: Exemption to 50.33, 50.34, and 50.54

- 50.34(a)(10) is the only regulation relevant to CP applications
- 50.33(g), 50.34(b)(6)(v), and 50.54(q) applicable to OL applications and licensees
- Intend to include all under same exemption request
 - ✓ Justification is the same

Option 2: Exemption to 50.33, 50.34, and 50.54

- 50.33(g)(1) and (2)
- (g)(1): Except as provided in paragraph (g)(2) of this section, if the application is for an operating license... the applicant shall submit the radiological emergency response plans of State and local governmental entities in the United States that are wholly or partially within the plume exposure pathway emergency planning zone (EPZ)
- (g)(2): ~~Small modular reactor, non-lightwater reactor, or non-power production or utilization facility~~ applicants complying with § 50.160 who apply for a construction permit or an operating license under this part... must submit as part of the application the analysis used to determine whether the criteria in § 50.33(g)(2)(i)(A) and (B) are met and, if they are met, the size of the plume exposure pathway EPZ.
- SMR would request partial exemption from (g)(2) as shown above
 - ✔ No need for exemption from (g)(1) if complying with (g)(2) as modified

Option 2: Exemption to 50.33, 50.34, and 50.54

- 50.34(b)(6)(v)(B)
- (6) The following information concerning facility operation:
 - (v) Plans for coping with emergencies based on:
 - (A) Except as provided in paragraph (b)(6)(v)(B) of this section, the requirements in appendix E to this part
 - (B) For a ~~small modular reactor, a non-light water reactor, or a non-power production or utilization facility~~ operating license applicant, the requirements in either § 50.160 or appendix E to this part.
- SMR would request partial exemption from (6)(v)(B) as shown above
 - ✓ No need for exemption from (6)(v)(A) if complying with (6)(v)(B) as modified

Option 2: Exemption to 50.33, 50.34, and 50.54

- 50.54(q)(2)(i) and (ii)
- (q)(2)(i) Except as provided in paragraph (q)(2)(ii) of this section, a holder of a license under this part, or a combined license ..., shall follow and maintain the effectiveness of an emergency plan that meets the requirements in appendix E to this part and, for nuclear power reactor licensees, the planning standards of § 50.47(b).
- (q)(2)(ii) A holder of a license under this part for a non-power production or utilization facility, a holder of a license under this part ~~for a small modular reactor or a non-light water reactor,~~ or a holder of a combined license ... ~~for a small modular reactor or a non-light water reactor,~~ shall follow and maintain the effectiveness of either an emergency plan that meets the requirements in § 50.160 or an emergency plan that meets the requirements in appendix E to this part and, for nuclear power reactor licensees, the planning standards of § 50.47(b).
- SMR would request partial exemption from (q)(2)(ii) as shown above
 - ✔ No need for exemption from (q)(2)(i) if complying with (q)(2)(ii) as modified

Option 2: Exemption to 50.33, 50.34, and 50.54

- 50.54(q)(3)(i) and (ii)
- (q)(3)(i) Except as provided in paragraph (q)(3)(ii) of this section, the licensee may make changes to its emergency plan without NRC approval only if the licensee performs and retains an analysis demonstrating that the changes do not reduce the effectiveness of the plan and the plan, as changed, continues to meet the requirements in appendix E to this part and, for nuclear power reactor licensees, the planning standards of § 50.47(b).
- (q)(3)(ii) ~~A non-power production or utilization facility, small modular reactor, or non-light-water reactor~~ licensee may make changes to its emergency plan without NRC approval only if the licensee performs and retains an analysis demonstrating that the changes do not reduce the effectiveness of the plan and the plan, as changed, continues to meet either the requirements in § 50.160 or the requirements in appendix E to this part and, for nuclear power reactor licensees, the planning standards of § 50.47(b).
- SMR would request partial exemption from (q)(3)(ii) as shown above
 - ✔ No need for exemption from (q)(3)(i) if complying with (q)(3)(ii) as modified

Option 3: Exemptions to 50.47 and Appendix E

- 50.160 rule was established specifically to avoid this situation
- SMR, LLC would pursue this approach as a last option

Option 3: Potential Exemptions



| Regulation | Exemption From | Regulation | Exemption From |
|----------------------|--|----------------------------|---|
| 10 CFR 50.33(g)(1) | Plume and Ingestion pathway EPZs | Appendix E, IV.C.1* | Emergency Classification Levels (Site Area Emergency and General Emergency) |
| 10 CFR 50.47(c)(2) | | Appendix E, IV.C.2* | Notification Times |
| 10 CFR 50.47(b)* | Offsite Emergency Plans | Appendix E, IV.D.2* | Periodic Dissemination of Information |
| 10 CFR 50.47(b)(3)* | Offsite Emergency Operations Facility | Appendix E, IV.D.3* | Public Alert and Notification |
| 10 CFR 50.47(b)(4)* | Offsite Response Measures | Appendix E, IV.D.4* | |
| 10 CFR 50.47(b)(5)* | Prompt Notification and Instruction to Population in EPZ | Appendix E, IV.E.8.a* | Emergency Response Facilities (TSC, OSC, and EOF) |
| 10 CFR 50.47(b)(6)* | Prompt Communications to the Public | Appendix E, IV.E.8.b* | |
| 10 CFR 50.47(b)(7)* | Periodic Dissemination of Information Brick-and-mortar Joint Information Center | Appendix E, IV.E.8.e* | |
| 10 CFR 50.47(b)(9)* | Assessment of Offsite Dose Consequences | Appendix E, IV.F.1.viii* | Licensee’s Headquarters Support Personnel |
| 10 CFR 50.47(b)(10)* | Offsite Protective Actions | Appendix E, IV.F.2* | Public Alert & Notification System |
| 10 CFR 50.47(c)(2) | Plume and Ingestion pathway EPZs | Appendix E, IV.F.2.a* | Full Participation Exercise |
| Appendix E, IV.2* | Evacuation Time Estimate | Appendix E, IV.F.2.a(i)* | |
| Appendix E, IV.3* | | Appendix E, IV.F.2.a(ii)* | |
| Appendix E, IV.4* | | Appendix E, IV.F.2.a(iii)* | |
| Appendix E, IV.5* | | Appendix E, IV.F.2.b* | |
| Appendix E, IV.6* | | Appendix E, IV.F.2.c* | |
| Appendix E, IV.7* | | Appendix E, IV.F.2.d* | |
| Appendix E, IV.A.3* | Licensee’s Headquarters Support Personnel | Appendix E, IV.F.2.f* | FEMA Evaluation of Offsite Emergency Plans |
| Appendix E, IV.A.8* | Offsite Protective Actions | Appendix E, IV.F.2.i* | Emergency Classification Levels (Site Area Emergency and General Emergency) |
| Appendix E, IV.B.1* | Assessment of Dose Offsite Consequences | | |

* Indicates the requested exemption would only apply if the SMR-300 EPZ is confined to the site boundary

Supporting Discussion: SMR-300 EPZ Analysis

- 10 CFR 50.33(g)(2) states, in part:
 - ✓ *Small modular reactor, non-lightwater reactor, or non-power production facility applicants complying with § 50.160 who apply for a construction permit or operating license under this part... must submit as part of the application the analysis used to determine whether the criteria in § 50.33(g)(2)(i)(A) and (B) are met and, if they are met, the size of the plume exposure pathway EPZ.*
- SMR, LLC does not intend to provide an SMR-300 EPZ analysis with this exemption request
 - ✓ Will be provided with a future construction permit application or as a licensing topical report

Additional Question – Exemption from Definition

■ Can SMR, LLC request an exemption from a definition?

- ✓ 50.12(a) The Commission may... grant exemptions from the requirements of the regulations of this part
 - Are “definitions” in the regulations legally distinct from “requirements”?
- ✓ NRC letter to CFPP ([ML22222A012](#)) suggests this is possible:
 - Letter recommends “applying for an exemption to the definition of ‘construction’ in 10 CFR 50.10(a)(1)”
 - Eventual exemption request ([ML23212A003](#)) was to 50.10(c) instead of 50.10(a)

Additional Question – Timing of Exemption

- Can SMR, LLC submit an exemption request without an application or independent of a topical report?
 - ✓ 50.12 does not require that the requestor or recipient of an exemption to be an applicant or licensee
 - ✓ Past precedent indicates that it is possible
- Example:
 - ✓ TVA/Clinch River ([ML23335A100](#))
 - Approved by the NRC in December 2024 ([ML24172A206](#))

Additional Question – Timing of Exemption

■ NRC basis for review?

- ✓ SMR will submit sufficient information with the exemption request or make available via audit
- ✓ TVA-Clinch River exemption approval relied on information provided in the exemption request and an associated virtual audit
- ✓ Example from approval ([ML24172A206](#), page 4):

“The NRC staff reviewed geologic information in the CRN Site exemption request using the criteria in NUREG-0800, Standard Review Plan (SRP), Chapter 2.5.1, ‘Geological Characterization Information’ and Chapter 2.5.3, ‘Surface Deformation.’”

Additional Question – Timing of Exemption

■ How can NRC guarantee applicability to future CPA?

- ✓ NRC could apply conditions to the approval
- ✓ NRC applied conditions to TVA approval
- ✓ Example from approval ([ML24172A206](#), page 9):

“Therefore, in the event that, during early excavation, the applicant needs additional retaining measures as part of the initial ground support system, the potential effects of all retaining measures on the RB structure shall be included as part of the SSI sensitivity analysis in a future CP licensing application.”

Summary

- SMR, LLC will submit an exemption to use 10 CFR 50.160 for SMR-300 EP
 - ✓ Regulatory basis: underlying purpose
 - ✓ SMR-300 has a significantly different risk profile than current fleet of large LWRs
 - Smaller
 - Passive safety features
 - Lower CDF and LRF
- Does the NRC have any issues with any of the identified options?