



Environmental Report: Environmental Impacts of Postulated Accidents

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[Not Export Controlled]

Review of SMR Licensing Plan

- Submit phased CP application [10 CFR 2.101(a)(9)]¹
 - ✓ Part 1: LWA application with comprehensive ER
 - ✓ Part 2: CPA application – no environmental review

	LWA	CP Part Two	OL
Environmental Submittal	Comprehensive ER (includes all construction and operation impacts)	None (new and significant review made available via audit) ²	Supplemental ER
Safety Submittal	LWA PSAR	CPA PSAR	FSAR

¹Additional discussion provided in backup slides. See also: [ML24074A294](#), ML24190A065, ML24226B364

²Provide supplement if new and significant information is identified

NRC Guidance – Environmental Impacts of Postulated Accidents

- RG 4.2, Section 5.11 covers:
 - ✓ Design Basis Accidents
 - ✓ Severe Accidents
 - ✓ Severe Accident Mitigation Alternatives (SAMAs)

- Analysis relies on:
 - ✓ Site information (e.g., meteorology)
 - ✓ Plant design (e.g., source term, PRA)

NRC Guidance – Environmental Impacts of Postulated Accidents

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Not docketed at
LWA stage



NRC Guidance – CP Applications

■ RG 4.2, Appendix A, Section A.3:

- ✓ References SECY-15-0002
- ✓ Recommends pre-application engagement with NRC staff
- ✓ Recommends use of preliminary design information (“best available information”) to evaluate severe accidents

■ SECY-15-0002, Enclosure 1, Item II.A:

“The staff needs a better understanding of specific reactor design concepts and potential licensing scenarios before the technical and policy challenges associated with SAMA review of CP applications can be assessed.”

NRC Guidance – CP Applications

■ RG 4.2, Appendix A, Section A.3:

- ✓ References SECY-15-0002
- ✓ Recommends pre-application engagement with NRC staff
- ✓ Recommends use of preliminary design information (“best available information”) to evaluate severe accidents

Preliminary design information for major safety-related systems is not docketed at LWA stage

SMR Plan for LWA ER – DBAs and Severe Accidents

- Use approach similar to an Early Site Permit
- Develop bounding estimates of key parameters
- Evaluate consequences based on those parameters

- Demonstrate applicability of parameters in CPA Part Two
 - ✓ Deterministic safety analysis -> DBAs
 - ✓ Probabilistic safety analysis -> Severe accidents
 - ✓ **No environmental review necessary to perform this validation**

SMR Plan for LWA ER – Severe Accident Mitigation Alternatives

- Use approach similar to TerraPower/Kemmerer ([ML24088A059](#))
 - ✓ Complete steps #1 and #2 of NEI 05-01 (SAMA Analysis Guidance Document)
- Estimate severe accident risk
 - ✓ Based on bounding assumptions for key parameters
- Estimate cost of the risk/maximum benefit
- Provide supplemental information in Operating License application
 - ✓ Identify SAMAs and evaluate benefits/costs
 - ✓ Describe design changes adopted due to evaluation

Summary of Planned Approach

	LWA (CP Part One)	CP Part Two	OL
Submittal	Comprehensive ER	None	Supplemental ER
Design Basis Accidents	Use assumed values and site-specific information. Establish environmental impacts and radiological risk. (Similar to ESP)	PSAR validates that the plant is bounded by assumptions in the ER (EIS bounds the impact of the plant). No environmental review required.	No action.
Severe Accidents	Use assumed values and site-specific information. Establish environmental impacts and radiological risk. (Similar to ESP)		No action.
Severe Accident Mitigation Alternatives	Estimate severe accident risk and cost of the risk/maximum benefit based on bounding assumptions. Commit to providing remaining information in the OL.		Provide results of SAMA/SAMDA evaluation.

Backup Slides

SMR Plans – LWA, CP, and ER

- SMR is using a pathway established by NRC regulations

§ 2.101(a)(9)(i) – LWA as Part One of Phased Application



§ 50.10(d)(3)(ii) – LWA Application – Environmental Report



§ 51.49(b) and (f) – ER for an LWA



§ 51.50(a) – ER for a CPA

SMR Plans – LWA, CP, and ER

■ [2.101](#), *Filing of application.*

(9) An applicant for a construction permit for a utilization facility which is subject to § 51.20(b) of this chapter and is of the type specified in § 50.21(b)(2) or (b)(3) or § 50.22 of this chapter, an applicant for or holder of an early site permit under part 52 of this chapter, or an applicant for a combined license under part 52 of this chapter, who seeks to conduct the activities authorized under § 50.10(d) of this chapter may submit a complete application under paragraphs (a)(1) through (a)(4) of this section which includes the information required by § 50.10(d) of this chapter. Alternatively, the applicant (other than an applicant for or holder of an early site permit) may submit its application in two parts:

(i) Part one must include the information required by § 50.33(a) through (f) of this chapter, and the information required by § 50.10(d)(2) and (d)(3) of this chapter.

(ii) Part two must include the remaining information required by the Commission's regulations in this chapter which was not submitted in part one, provided, however, that this information may be submitted in accordance with the applicable provisions of paragraph (a)(5) of this section, or, for a construction permit applicant, paragraph (a)(1) of this section. Part two of the application must be submitted no later than 18 months after submission of part one.

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■ [50.10\(d\)](#), *Request for limited work authorization.*

(3) The application must include:

- (i) A safety analysis report required by 10 CFR 50.34... a description of the activities requested to be performed, and the design and construction information otherwise required by the Commission's rules and regulations to be submitted for a construction permit... but limited to those portions of the facility that are within the scope of the limited work authorization. The safety analysis report must demonstrate that activities conducted under the limited work authorization will be conducted in compliance with the technically-relevant Commission requirements in 10 CFR Chapter I applicable to the design of those portions of the facility within the scope of the limited work authorization;
- (ii) An environmental report in accordance with § 51.49 of this chapter; and
- (iii) A plan for redress of activities performed under the limited work authorization, should limited work activities be terminated by the holder or the limited work authorization be revoked by the NRC, or upon effectiveness of the Commission's final decision denying the associated construction permit or combined license application, as applicable.

■ [51.49\(b\)](#), *Phased application for limited work authorization and construction permit or combined license*

“If the construction permit or combined license application is filed in accordance with § 2.101(a)(9) of this chapter, then the environmental report for part one of the application may be limited to a discussion of the activities proposed to be conducted under the limited work authorization. If the scope of the environmental report for part one is so limited, then part two of the application must include the information required by § 51.50, as applicable.”

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■ [51.49\(f\)](#), *Environmental Report*

“An environmental report submitted in accordance with this section must separately evaluate the environmental impacts and proposed alternatives attributable to the activities proposed to be conducted under the LWA. At the option of the applicant, the "Applicant's ER—LWA Stage," may contain the information required to be submitted in the ER required under § 51.50, which addresses the impacts of construction and operation for the proposed facility (including the environmental impacts attributable to the LWA), and discusses the overall costs and benefits balancing for the proposed action.”

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■ [51.76\(b\)](#), *Phased application for LWA under §2.101(a)(9)*

“If the application for a LWA is submitted in accordance with § 2.101(a)(9) of this chapter, then the draft EIS for part one of the application may be limited to consideration of the activities proposed to be conducted under the LWA, and the proposed redress plan. However, if the ER contains the full set of information required to be submitted under § 51.50(a), then a draft EIS must be prepared in accordance with § 51.75(a). Siting issues, including whether there is an obviously superior alternative site, or issues related to operation of the proposed nuclear power plant at the site, including need for power, may not be considered. After part two of the application is docketed, the NRC will prepare a draft supplement to the final EIS for part two of the application under § 51.72.”

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■ [51.50](#), *Environmental report, (a) Construction permit stage.*

Each applicant for a permit to construct a production or utilization facility covered by § 51.20 shall submit with its application a separate document, entitled "Applicant's Environmental Report—Construction Permit Stage," which shall contain the information specified in §§ 51.45 [general requirements], 51.51 [uranium fuel cycle environmental data], and 51.52 [effects of transportation of fuel and waste]. Each environmental report shall identify procedures for reporting and keeping records of environmental data, and any conditions and monitoring requirements for protecting the non-aquatic environment, proposed for possible inclusion in the license as environmental conditions in accordance with § 50.36b of this chapter. As stated in § 51.23, no discussion of the environmental impacts of the continued storage of spent fuel is required in this report.

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■ [51.45](#), *Environmental report*

“(b) *Environmental considerations*. The environmental report shall contain a description of the proposed action, a statement of its purposes, a description of the environment affected, and discuss the following considerations:

- 1) The impact of the proposed action on the environment. Impacts shall be discussed in proportion to their significance;
- 2) Any adverse environmental effects which cannot be avoided should the proposal be implemented;
- 3) Alternatives to the proposed action. The discussion of alternatives shall be sufficiently complete to aid the Commission in developing and exploring, pursuant to section 102(2)(E) of NEPA, "appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." To the extent practicable, the environmental impacts of the proposal and the alternatives should be presented in comparative form;
- 4) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and
- 5) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

(c) *Analysis*. The environmental report must include an analysis that considers and balances the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action, and alternatives available for reducing or avoiding adverse environmental effects...”

NRC Guidance – CP Applications

■ [SECY-15-0002](#), Enclosure 1, Item II.A:

“A court decision⁷ associated with NRC review of the Limerick operating license application prompted the NRC to address severe accident mitigation alternatives (SAMA) in the agency’s environmental impact statements (EIS). Subsequent to that decision, the NRC has included a SAMA analysis in its EISs for operating license and license renewal reviews. However, the NRC has never issued an EIS containing a SAMA analysis for a CP application review; no CP application has been submitted since the Limerick decision. As a result, there are only limited practical examples and guidance regarding how the SAMA analysis should be addressed in a CP application and, subsequently, in the NRC staff’s EIS.”

⁷Limerick Ecology Action Inc. v. NRC, 869 F.2d 719 (3d Cir. 1989)

NRC Guidance – CP Applications

■ [RG 4.2](#), Appendix A, Section A.3

“...the Staff Requirements Memorandum for SECY-15-0002 (Ref. A8) sets an expectation that licensing under 10 CFR Part 50 be performed consistently with 10 CFR Part 52, including how risk and severe accidents are addressed. Therefore, a CP application should provide information derived from the preliminary design to address these topics. A CP application should provide the best available information to assess SAMAs/SAMDAs.”