



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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**U.S. NUCLEAR REGULATORY COMMISSION STAFF'S OBSERVATIONS REGARDING
XE-100 WHITE PAPER: EMERGENCY PLANNING APPROACH AND REGULATORY
ANALYSIS (EPID: L-2023-LRO-0062)**

SPONSOR INFORMATION

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Project No.: 99902071

DOCUMENT INFORMATION

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Submittal Agencywide Documents Access and Management System (ADAMS) Accession No.: ML23240A744

Brief Description of the White Paper: X-Energy, LLC (X-energy) stated that the purpose of this white paper is to present the emergency planning approach applicable to the Xe-100 reactor technology and to provide a pathway to address the emergency planning (EP) information necessary to obtain a construction permit (CP) and an operating license (OL) for prospective applicants seeking to utilize the Xe-100 reactor technology.

Action Requested: X-energy requested the U.S. Nuclear Regulatory Commission (NRC) staff's feedback on the presented emergency planning approach.

FEEDBACK AND OBSERVATIONS

The feedback and observations on this white paper are preliminary and subject to change. The feedback and observations are not regulatory findings on any specific licensing matter and are not official agency positions.

Observations related to CP Application Contents:

1. Section 2, "Overview of current EP regulations and Guidance Documents applicable to the Xe-100 Reactor Technology," of the white paper appears to reflect applicable regulatory requirements for X-energy's preliminary plans for coping with emergencies. Specifically, Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.34,

Enclosure

“Contents of applications; technical information, paragraph (a) “Preliminary safety analysis report,” including 10 CFR 50.34(a)(10), which requires that the preliminary safety analysis report (PSAR) include “[a] discussion of the applicant’s preliminary plans for coping with emergencies” was appropriately captured.

2. Section 2.1, “Construction Permit Application and Preliminary Safety Analysis Report,” of the white paper adequately provides a discussion of the preliminary plans for coping with emergencies within the PSAR submittal as required by 10 CFR 50.34(a)(10). The NRC staff has confirmed that the items identified as requiring a description are aligned with Paragraphs A through H of Section II of Appendix E to 10 CFR Part 50, “Emergency Planning and Preparedness for Production and Utilization Facilities.”
3. Regulation 10 CFR Part 50.34(a)(10) requires applicants for a CP to provide a discussion of the applicant’s preliminary plans for coping with emergencies. Regulation 10 CFR Part 50, Appendix E sets forth items which shall be included in these plans. Section 2, “Overview of Current EP Regulations and Guidance Documents Applicable to the Xe-100 Reactor Technology,” paragraph 3, states in part, an applicant’s preliminary plans for coping with emergencies can be based on the requirements in either Appendix E to 10 CFR Part 50 or 10 CFR 50.160. The NRC staff notes that 10 CFR 50.160 provides alternative performance-based, technology-inclusive, risk-informed, and consequence-oriented approach to EP that provides an alternative to the EP requirements under 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50 as part of the Final Safety Analysis Report (FSAR) at the OL stage. As such, the NRC staff notes that for the CP application, the information must demonstrate compliance with the applicable requirements under Appendix E to 10 CFR Part 50.
4. Section 2, “Overview of current EP regulations and Guidance Documents applicable to the Xe-100 Reactor Technology,” provides the EP requirements applicable to licensing the Xe-100 reactor technology. It was noted by the NRC staff that the regulatory reference to 10 CFR 50.35, “Issuance of Construction Permits,” and 10 CFR 50.40, “Common Standards,” was not included. It is recommended that these regulatory references be included as part of the CP application, as applicable.

Observations related to OL Application Contents:

1. Section 2, “Overview of current EP regulations and Guidance Documents applicable to the Xe-100 Reactor Technology,” appear to reflect applicable regulatory requirements for X-energy’s intended submittal for an OL including a FSAR as detailed in 10 CFR 50.34(b) and plans for coping with emergencies, as detailed in Sections III and IV of Appendix E to 10 CFR Part 50. This information was captured in Section 2.2, “Operating License Application (FSAR)”.
2. Section 2 appropriately refers to 10 CFR 50.47(b) and 16 planning standards that will be addressed as part of X-energy’s intended submittal for an OL as part of the FSAR.
3. Section 2.2, “Operating License Application (FSAR),” appropriately refers to 10 CFR Part 50 Appendix E Subparts III and IV pertaining to the content of the proposed FSAR submittal and emergency plan contents.

Generic Observations related to the Xe-100 Emergency Planning Approach and Regulatory Analysis White Paper

1. Section 4, "U.S. NRC Engagement Plan for EP," identifies the need for pre-application regulatory engagement with the NRC staff that would provide future CP and OL applicants with regulatory stability in content expectations prior to developing a 10 CFR Part 50 application. Section 4.1, "EPZ Sizing Methodology," appears to be following the regulations and identifies opportunities for engagement with the NRC staff where they differ. The white paper acknowledges the need for X-energy to develop a topical report that provides a technical basis for the Xe-100 emergency planning zone (EPZ) sizing methodology and submit it to the NRC staff for review and approval prior to the OL application submission and regardless of the regulatory pathway chosen (i.e., 10 CFR 50.47 and Appendix E to 10 CFR Part 50 or 10 CFR 50.160 which was published on November 16, 2023).
2. Offsite EP is wholly within the control of responsible state and local agencies. While it may be possible to demonstrate a low likelihood of exceeding the U.S. Environmental Protection Agency Protective Action Guides offsite, it should be clear that the EPZ only bounds the planning onsite for initial response actions, but it does not preclude a potential response beyond the EPZ or site-boundary should that prove necessary. An emergency plan based on a site-boundary EPZ should be clear on how actions will be initiated outside of the EPZ within the OL application submittal, if necessary. For example, the titles and summary of appropriate emergency plan procedure(s) that provide a summary of necessary communication and coordination protocols with response organizations beyond the EPZ or site-boundary including but not limited to fire and police response organizations. Anticipated exemption requests to align the EP requirements commensurate with risks associated with the Xe-100 reactor technology have been summarized in Table 1, "Anticipated Exemptions from 10 CFR 50.47 and Appendix E to 10 CFR Part 50," within Section 2.4 of the white paper. X-energy should ensure all exemptions are fully supported within the OL submittal. For example, 10 CFR 50.47(b)(5) contains requirements for notification, by the licensee, of state and local response organizations. Regulation 10 CFR 50.47(b)(5) is a risk-significant planning standard that ensures state and local agencies are notified of an emergency event, even if they are not responding. As a result, it is recommended that strikeout language (full or partial) pertaining to each of the applicable 10 CFR 50.47 and 10 CFR Part 50, Appendix E requirements are provided in support of any exemption requests.

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