

The U.S. Nuclear Regulatory Commission Staff's Observations on "Submission of X Energy, LLC (X-energy) Xe-100 Licensing White Paper: Use of Bounding Values"

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the X Energy LLC (X-energy) white paper, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21295A296), regarding a roadmap on how X-energy plans to address bounding values (BV) in an Environmental Report as part of an application for the Xe-100 reactor design under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities." The NRC staff's observations are provided below.

General Comments

1. This white paper is part of X-energy's engagement regarding ongoing advanced reactor initiatives and awareness of regulatory guidance relevant to the NRC staff's environmental reviews.
2. The white paper describes X-energy's intent to use BVs to bound environmental impacts associated with the deployment of up to 12 units at a single site.
3. As discussed in the draft white paper, "Pre-application Engagement to Optimize Advanced Reactors Application Reviews," dated May 2021 (ADAMS Accession No. ML21145A106), the NRC staff encourages the use of available tools and guidance, especially for novel design features or planned approaches that differ from current operating reactors.
4. The NRC staff observes that X-energy's intended sequence for Operating Licenses (OLs) is important from a National Environmental Policy Act (NEPA) perspective. The NRC staff notes that under current regulations for a Construction Permit (CP) and subsequent OLs, the transition from construction to operation under 10 CFR Part 50, allows for issuing separate OLs for the reactors at different times as some reactors may not be brought into operation at the same time. For multi-reactor sites, issuing a separate OL for each reactor has been the NRC's historical practice for CP applications. For the environmental review, after an initial OL is issued for the first reactor, the NRC staff may need to evaluate each additional reactor for new and significant information to supplement the environmental impact statement (EIS) with any new findings as applicable, before issuing the subsequent OL per 10 CFR 50.34(b) and 10 CFR 51.53(b).
5. The NRC staff is not providing any comments or judgment regarding the applicability of the BV approach as cited in the white paper or any characteristics for an Xe-100 site at this time as these types of discussions are best held with the NRC staff during the pre-application process. Examples of these types of statements made by X-energy that the NRC staff is not commenting on include:
 - a. Anticipated "problems" associated with each of the "four licensing scenarios in RG 4.2" related to the Advanced Reactor Demonstration Program (ADRP) project as described in Section 4.1, "Licensing Scenarios."
 - b. X-energy's effort to negotiate a lease to "ensure that the lease language

Enclosure

sufficiently demonstrates EN's control of the site," as described in Section 3.2.4, "Energy Northwest Site Control and Lease Negotiations," as the sensitivity of BVs are dependent on securing the WNP-1 site as described in Section 4.2.3, "Sensitivity of Major Design Parameter Bounding Values."

6. The NRC staff will review such statements and any justifications for requested exemptions as appropriate after the receipt and the acceptance of an application for the Xe-100 at a specific site.

Specific Comments by Section

Section 1, "INTRODUCTION." No Comment.

Section 2, "BOUNDING VALUE CONCEPTS." No Comment.

Section 3, "ESTABLISHMENT OF THE NEED FOR POWER RELATED TO THE ADVANCED REACTOR DEMONSTRATION PROGRAM"

Section 3.2.4, "Energy Northwest Site Control and Lease Negotiations." X-energy states that "the lease will cease on year 25 of the operating license. EN is working with DOE to extend the lease until at least 2067." The NRC staff notes that this issue must be settled before a construction permit license is issued by the NRC for the possible siting of the X-energy reactor design within DOE-controlled land.

Section 4, "PROPOSED BOUNDING APPROACH"

Section 4.1, "Licensing Scenarios," Figure 1, "Possible Licensing Scenarios for ARDP Xe-100 Deployment." The NRC staff notes that based on item 4 in the General Comments above, the NEPA review and licensing scenarios are topics for further discussions.

Section 4.1.1, "Scenario 1 Applicability to the ARDP Xe-100 Project." The NRC staff notes that in order to set the scope of an environmental review and potential timing of impacts, a construction schedule over the stated 15-year construction timeframe should be estimated and provided in a future application.

Section 4.1.2, "Scenario 2 Applicability to the ARDP Xe-100 Project." X-energy suggests that "...an approach under Scenario 2 would require complete revision of the ER for future units..." However, the NRC staff notes that impacts and analysis from the first (or prior) environmental report (ER) and EIS could be incorporated by reference to the next ER with added new and significant information if appropriate. Therefore, an ER that has been completely revised may not be necessary to analyze the added impacts of each additional module based on information from the initial construction and operation of the first 4-unit module.

Section 4.2.3, "Sensitivity of Major Design Parameter Bounding Values," "Environmental Justice." For awareness, the NRC staff is conducting a systematic review of how the agency's programs, policies, and activities address environmental justice. [As directed by the Commission](#) in a letter dated April 23, 2021 (ADAMS Accession No. ML21113A070), the NRC staff will evaluate recent Executive Orders and assess whether environmental justice is appropriately considered and addressed in the agency's programs, policies, and activities, such

as adjudicatory procedures and environmental reviews, given the agency's mission.

Section 4.2.3, "Sensitivity of Major Design Parameter Bounding Values," "Air Resources." The NRC staff notes that radiological impact to construction workers would depend on whether the additional 4-unit modules are built sequentially after the first four and the locations of the additional units/modules are built (e.g., immediately adjacent, etc.). The arrangement and distances would be factors to be considered for construction worker doses in addition to the timing of construction and operation of subsequent 4-unit modules.

Section 4.2.3, "Sensitivity of Major Design Parameter Bounding Values," "Environmental Impacts of Waste." The NRC staff notes that the impacts of waste would likely also depend on how the development and expansion of the common use buildings/facilities occurs (e.g., the radwaste buildings).

Section 5, "CONCLUSIONS." No Comment.

Section 6, "REFERENCES." No Comment.