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To: [Maggie Staiger](#)
Cc: [Jessica Maddocks](#); [Adrian Muniz](#)
Subject: NRC Discussion Topics for Public Meeting with X Energy, LLC on Atmospheric Dispersion and Dose Calculation Methodology Topical Report
Date: Thursday, September 21, 2023 12:23:00 PM
Attachments: [X Energy, LLC - Discussion Topics Regarding X-energy Atmospheric Dispersion and Dose Calculation Topical Report.pdf](#)

Dear Maggie Staiger,

Attached are the discussion topics/questions that the NRC staff would like to discuss with X Energy, LLC (X-energy) during a public meeting. The NRC staff notes that the scheduling of the public meeting is dependent on X-energy providing a revised public version of the atmospheric dispersion and dose calculation methodology topical report. This revised public version of the topical report should address NRC staff's comments pertaining to marking of proprietary information so that a public version of the topical report can be released to the public. Delays in holding this public meeting could affect the current reflected review schedule communicated to X-energy and any updates to the review schedule would be separately communicated to X-energy.

Please let me know if you have any questions or comments.

Thank you,

Zackary Stone, Project Manger
Advanced Reactor Licensing Branch 2
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X-energy Topical Report: “Atmospheric Dispersion and Dose Calculation Methodology” Discussion Topics

By letter dated May 26, 2023, X Energy, LLC (X-energy) submitted topical report (TR), “Atmospheric Dispersion and Dose Calculation Methodology,” for the U.S. Nuclear Regulatory Commission (NRC) staff’s review. The NRC staff identified the following areas for discussion:

1. Section 1.2, “Scope,” states that the TR methodology is focused on safety analysis applications. Please confirm that the methodology is not intended for environmental analyses.
2. Section 2.1, “NRC Regulations,” includes only relevant regulations for the safety analysis under Part 50 licensing framework, while Section 1.5 provides an objective for the outcome for the Part 52 licensing framework also. Please clarify how the relevant Part 52 regulations are applicable to this TR and please clarify whether this TR methodology is applicable to test reactors.
3. Section 2.2, “Regulatory Guidance,” includes RGs 1.3 and 1.4 with respect to guidance on wind speed and stability class. The NRC staff notes that RGs 1.3 and 1.4 have been withdrawn and appropriate relevant guidance on wind speed and stability class is given in RG 1.23, “Meteorological Monitoring Programs for Nuclear Power Plants.” Please clarify the regulatory guidance used for wind speed and stability class in the TR.
4. In Section 4.4, “Execution and Evaluations of AOOs, DBEs, and BDBEs Analyses,” for what purpose is the dose in the control room being assessed for AOOs, DBEs and BDBEs, given that the NEI-18-04 process does not have a control room dose criterion?
5. In Section 4.4, is assessment of the integrated risks over all LBEs against QHOs as described in NEI 18-04 in scope for this TR?
6. With respect to Section 4.5, “Execution and Evaluation of DBAs and External Hazards,” the offsite dose criteria in 10 CFR 50.34(a) (and similar in Part 52) include an evaluation of the dose at the outer boundary of the low population zone (LPZ) for the duration of the passage of the plume, in addition to the dose for any 2-hr period at the exclusion area boundary (EAB). The NRC staff notes that there appears to be no discussion regarding evaluating doses at the LPZ, please clarify.
7. In Section 4.5, given the statement that the control room is not credited in the performance of required safety functions for DBAs, and the stated conclusion that control room dose will not be evaluated for the deterministic events, will the principal design criteria for the Xe-100 differ from the LWR-related general design criteria in Appendix A to Part 50 such that a control room radiological habitability criterion is not included?
8. Section 5.2.1.1, “Overview of the XDIS Code,” states that the XDIS code uses a Gaussian plume model, but Sections 5.1 and 5.3 state that capability of the code is not used in the TR methodology (i.e., the dispersion factors in the Xe-100 safety analysis will be calculated independently and entered into XDIS as user input). Please clarify this apparent discrepancy.

9. With respect to the information in Section 7, please clarify whether X-energy is requesting approval of the XDIS code through this TR.
10. Does XDIS calculate the maximum 2-hr EAB dose for any time period over the duration of the release?
11. The NRC staff notes that in the Section 7 verification of the methodology, the use of the TID-14844 instantaneous source term does not exercise the capability of the methodology and the XDIS code to calculate a maximum 2-hr dose for the EAB for a time-varied release. Please clarify.
12. Section 4.4, "Execution and evaluations of AOOs, DBEs, and BDBEs analyses," states, "These methods do not require deterministic analyses to be performed for AOOs, DBEs, and BDBEs." Section 4.5, "Execution and evaluation of DBAs and external hazards" states, "These methods also require that specifically defined deterministic analyses be performed for DBAs to evaluate the effectiveness of safety-related SSCs in performing their required safety functions." Please clarify what is intended by the terms "deterministic analysis" and "specifically defined deterministic analysis."
13. Section 5.2.1 states, "The Gaussian plume exposure model calculates:... Data logging of transient dose." Please clarify what is meant by the term "data logging of transient dose."
14. Section 7, "XDIS dose methodology verification," includes the following bullets:
 - I-131 core inventory = 2.452E-04 Ci/MWt
 - Breathing rate, BR (0-8 hour) = 3.47E+04 m3/secIt appears that the signs of the exponents in these two bullets were reversed, please clarify.
15. Section 5.3 includes the following statement, "The Gaussian plume dose model in XDIS is based on the HotSpot code in Equation 8." What will the plume model in XDIS from HotSpot be used for? If it will be used for reactor licensing (i.e., in the applicant's safety analysis report), how will it be applied?
16. Is application of the non-DBA EAB X/Q reduction factor to the estimation of site characteristic X/Qs using site-specific meteorological data in a license application outside the scope of the topical report methodology?
17. Section 5.1.1.2.1.1 "EAB Dispersion Factors Methodology Assumptions" lists the proposed EAB X/Q reduction factors. The NRC staff notes that the basis for the proposed EAB X/Q reductions factors is not clear, please clarify.
18. Sections of the topical report use EAB and LPZ interchangeably. However, there are only dispersion factors listed for the CR and EAB in Table 3. Do the EAB values apply to the LPZ as well? If not, what approach does X-energy plan to use to develop the LPZ X/Q values?
19. The NRC staff notes that DG-4030 has been finalized and issued as RG 1.249 (August 21, 2023). Please clarify if X-energy intends to update the reference to this document.