



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 9, 2023

Travis Chapman
Director, Reactor Licensing
and Regulatory Affairs
X Energy, LLC
801 Thompson Avenue
Rockville, MD 20852

SUBJECT: X ENERGY, LLC – FINAL SAFETY EVALUATION FOR “XE-100 TOPICAL
REPORT: TRISO-X PEBBLE FUEL QUALIFICATION METHODOLOGY”
(REVISION 3) (EPID NO. L-2021-TOP-0011/CAC NO. 000431)

Dear Mr. Chapman:

By letter dated April 30, 2021, X Energy, LLC (X-energy) submitted topical report (TR) “Xe-100 Topical Report: TRISO-X Pebble Fuel Qualification Methodology,” Revision 1, (Agencywide Document Access and Management System (ADAMS) Accession No. ML21120A332) for the U.S. Nuclear Regulatory Commission (NRC) staff’s review. This TR summarizes the fuel qualification approach and methodology for the tri-structural isotropic (TRISO)-coated particle fuel pebbles to be used in the Xe-100 high temperature gas-cooled reactor design under development by X-energy. A closed meeting was held on June 4, 2021, to provide the NRC staff with an overview of the TR (ML21354A289).

On September 2, 2021 (ML21246A289), X-energy submitted Revision 2 of the TR for the NRC staff’s review, which was updated from Revision 1 based on the NRC staff’s feedback provided during the June 4, 2021, closed meeting. The NRC staff reviewed the TR and issued requests for additional information (RAIs) on December 2, 2022 (ML21334A230). A closed meeting was held on February 10, 2022 (ML22166A418), to clarify the RAIs. The NRC staff received RAI responses on February 28, 2022 (ML22059A770), and a closed meeting was held on May 20, 2022 (ML22166A424), to discuss the RAI responses.

By letter dated July 29, 2022 (ML22216A179), X-energy submitted Revision 3 of the TR for the NRC staff’s review, which addressed the RAIs and RAI responses related to Revision 2 of the TR. By letter dated September 21, 2022 (ML22265A218), X-energy requested the withdrawal of Revisions 1 and 2 of the TR. Accordingly, the NRC staff continued its review of Revision 3 of the TR.

On November 7, 2022, the NRC staff provided X-energy a draft of the safety evaluation (SE) to ensure the correct marking of proprietary information (ML22194A948). X-energy confirmed the marking of proprietary information in a letter dated November 30, 2022 (ML22363A285). The final NRC staff SE for Revision 3 of the TR is enclosed. A redacted version of the SE will be made publicly available.

In accordance with the NRC’s published information for TRs available at <https://www.nrc.gov/about-nrc/regulatory/licensing/topical-reports.html>, the NRC staff requests

T. Chapman

- 2 -

that X-energy publish an accepted version of this TR within 3 months of the receipt of this letter. The accepted version should incorporate this letter and the enclosed SE. Also, the accepted version must contain historical review information, including the RAIs and RAI responses. The accepted version should include an "-A" (designated accepted) following the TR identification number.

As an alternative to including the RAIs and RAI responses, if changes to the TR were provided to the NRC staff to support the resolution of RAI responses, and the NRC staff reviewed and approved those changes, there are two ways that the accepted version can capture the RAIs:

1. The RAIs and RAI responses can be included as an Appendix to the accepted version.
2. The RAIs and RAI responses can be captured in the form of a table (inserted after the final SE) which summarizes the changes as shown in the accepted version of the TR. The table should reference the specific RAIs and RAI responses which resulted in any changes, as shown in the accepted version of the TR.

If you have any questions or comments concerning this matter, please contact Michael Orenak at (301) 415-3229 or via e-mail at or Michael.Orenak@nrc.gov.

Sincerely,



Signed by Jessup, William
on 03/09/23

William Jessup, Chief
Advanced Reactor Licensing Branch 1
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

Project No.: 99902071

Enclosure:
As stated

cc via ListServe: Distribution at X-Energy Xe-100

The Enclosure to this letter contains
Proprietary Information. When separated
from the Enclosure, this letter is
DECONTROLLED.

SUBJECT: X ENERGY, LLC – FINAL SAFETY EVALUATION FOR “XE-100 TOPICAL REPORT: TRISO-X PEBBLE FUEL QUALIFICATION METHODOLOGY” (REVISION 3) (EPID NO. L-2021-TOP-0011/CAC NO. 000431) DATED: MARCH 9, 2023

DISTRIBUTION:

PUBLIC	BAdams, NRR
X-Energy Xe-100	BTravis, NRR
SDevlin-Gill, NRR	JSchmidt, NRR
LVechioli, NRR	JBowen, NRR
KWagner, NRR	MShams, NRR
MOrenak, NRR	RidsNrrLACSmith Resource
WJessup, NRR	RidsNrrOd Resource
MHayes, NRR	RidsOgcMailCenter Resource
GOberson, NRR	RidsNrrDanu Resource
DGreene, NRR	RidsNrrDanuUal1 Resource
RAnzalone, NRR	RidsNrrDanuUal2 Resource

ADAMS Accession Nos.:

Package: ML22327A199

Letter: ML22327A198

Enclosure: ML22327A202

NRR-106

OFFICE	NRR/DANU/UAL1:PM	NRR/DANU/UAL1:PM	NRR/DANU/UAL2:LA	OGC
NAME	KWagner	MOrenak	CSmith	JEzell
DATE	02/06/2023	02/16/2023	03/08/2023	09/30/2022
OFFICE	NRR/DANU/URT1:BC	NRR/DANU/UAL1:BC		
NAME	MHayes	WJessup		
DATE	10/17/2022	3/9/2023		

OFFICIAL RECORD COPY