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OFFICER

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

August 1, 2024

Aylin Kucuk, Program Manager
Nuclear Fuels Electric Power Research Institute
Charlotte Office
1300 West W.T. Harris Blvd
Charlotte, NC 28262-8550

SUBJECT: LETTER TO THE ELECTRIC POWER RESEARCH INSTITUTE IN RESPONSE TO A REQUEST FOR A FEE EXEMPTION FOR PWR LOSS OF COOLANT ACCIDENT INDUCED FUEL FRAGMENTATION RELOCATION AND DISPERSAL FOR FUEL OPERATING TO EXTENDED BURNUP: ALTERNATIVE LICENSING STRATEGY

Dear Aylin Kucuk:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), I am responding to your letter dated April 26, 2024, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML24121A209), requesting a fee exemption under Title 10 of the *Code of Federal Regulations* (10 CFR) 170.11(a)(1)(ii) for the NRC staff's review of the Electric Power Research Institute (EPRI) Analysis of PWR LOCA-Induced Fuel Fragmentation Relocation and Dispersal (FFRD) for Fuel Operating to Extended Burnup: Alternative Licensing Strategy (Proprietary/Non-Proprietary)," for three topical reports (i.e., EPRI Report 3002028673, 3002023895, and 3002028674/5).

The NRC has established regulations for the granting of fee exemptions under 10 CFR 170.11 "Exemptions." An interested person may apply for an exemption under 10 CFR 170.11 in accordance with 10 CFR 170.5, "Communications."¹ The NRC staff reviewed your request based on the regulations in 10 CFR 170.11(a)(1)(ii) and 10 CFR 170.11(d).

Section 170.11(a)(1)(ii) states:

No application fees, license fees, renewal fees, inspection fees, or special project fees shall be required for: (1) A special project that is a request/report submitted to the NRC— . . . (ii) When the NRC, at the time the request/report is submitted, plans to use the information to assist the NRC in generic regulatory improvements or efforts (e.g., rules, regulatory guides, regulations, policy statements, generic letters, or bulletins).

Section 170.11(d) states:

All fee exemption requests must be submitted in writing to the Chief Financial

¹ 10 CFR 170.5 provides that "All communications concerning the regulations in this part should be addressed to the NRC's Chief Financial Officer, either by mail to the U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; by hand delivery to the NRC's offices at 11555 Rockville Pike, Rockville, Maryland; or, where practicable, by electronic submission, for example, via Electronic Information Exchange, or CD-ROM."

Officer in accordance with § 170.5, and the Chief Financial Officer will grant or deny such requests in writing.

Based on the NRC's staff review, I am granting your fee exemption request for the review of the three referenced topical reports, as these reports will assist the NRC in generic regulatory improvements or efforts to address direction from the Commission to address FFRD as part of a rulemaking effort to facilitate efficient licensing of high burnup fuel.

On April 26, 2024 (ML24121A203), EPRI submitted Report 3002028673, "Loss-of-Coolant-Accident-Induced Fuel Fragmentation, Relocation and Dispersal with Leak-Before-Break Credit: Alternative Licensing Strategy," which references EPRI Report 3002028675, "LOCA Analysis of Fuel Fragmentation, Relocation, and Dispersal for Westinghouse 2-Loop, 3-Loop, and 4-Loop Plants –Evaluation of Cladding Rupture in High Burnup Fuel Rods Susceptible to Fine Fragmentation (ML24121A208 – non-proprietary), and EPRI Report 3002023895, "Materials Reliability Program: xLPR Estimation of PWR Loss-of-Coolant Accident Frequencies (MRP-480)."

In your letter, you stated that these topical reports were developed in response to Commission direction to incorporate risk insights and address FFRD issues within a durable regulatory framework that will assist NRC with meeting objectives outlined in the NRC staff's "Project Plan to Prepare the U.S. Nuclear Regulatory Commission for Efficient and Effective Licensing of Accident Tolerant Fuels," Version 1.2, dated September 2021 (ML21243A298). In addition, your letter stated that the adoption of high burnup fuel varies by the class of plant; as a result, the initial scope of these topical reports focuses on plants most likely to be early adopters of high burnup fuel and provides specific requirements for broader application of this regulatory approach at any PWR plant. Further, you stated that its submittal justifies a simplified analysis approach, which will reduce the scope of the NRC review by justifying that rupture of high burnup fuel cladding is not credible for large break LOCA events while demonstrating acceptable performance for smaller break size scenarios.

In the above referenced project plan, the NRC committed to enabling the safe use of new technologies, especially those that can make NRC-regulated facilities safer. The U.S. nuclear industry, assisted by the U.S. Department of Energy, plans to deploy batch loads² of fuels with higher burnup levels in the operating fleet on an aggressive timeline. To ensure the NRC was ready to review the batch loads of higher burnup fuels, as well as other options for near-term technologies (coated cladding, doped pellets, iron-chromium-aluminum cladding, and increased enrichment), the NRC staff evaluated the regulatory framework and determined the framework is capable of reviewing higher burnup fuels without changes to the current regulations and guidance through the use of existing processes.

Additionally, the NRC is currently undertaking a rulemaking to facilitate the use of light-water reactor (LWR) fuel containing uranium enriched to greater than 5.0 and less than 20.0 weight percent uranium-235 (U-235) (referred to as the Increased Enrichment Rulemaking). On March 16, 2022, the Commission approved the staff's plan to initiate this rulemaking and directed that the regulatory basis for this rulemaking appropriately address and analyze fuel fragmentation, relocation, and dispersal (FFRD) issues relevant to fuels of higher enrichment and burnup levels (ML22075A103). Consistent with this direction, the NRC staff published "Increased Enrichment of Conventional and Accident Tolerant Fuel Designs for Light-Water Reactors, RIN Number: 3150-AK79, NRC Docket ID: NRC-2020-0034, Regulatory Basis

² A batch reload is defined as the typical number of fuel assemblies that are replaced in the reactor core after each operating cycle; this is generally around one-third of the total fuel assemblies in the core.

Document for Public Comment,” dated September 2023 (ML23032A504). The regulatory basis assesses five possible alternatives to address FFRD issues, and it considers the impacts of each possible alternative.

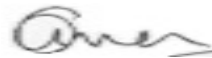
The NRC staff plans to use the information in all three topical reports to assist the NRC efforts to address FFRD issues relevant to fuels of higher enrichment and burnup levels as part of the Increased Enrichment Rulemaking. The EPRI topical reports present a similar approach to Alternative 5 for FFRD issues in the regulatory basis document. Therefore, review and potential approval of these reports will assist the staff in considering Alternative 5 as the rulemaking progresses. Further, these topical reports could form part of the regulatory framework supporting implementation of a version of Alternative 5. The NRC staff considers these reports a contributor to a generic regulatory effort to establish viable and successful licensing pathways for higher burnup fuel.

With respect to EPRI Report 3002028674/5 specifically, this topical report presents composite, bounding modeling approaches to demonstrate acceptable performance for small-break and intermediate-break LOCAs assuming specific Westinghouse fuel and reactor designs. Although the analytical approach is specific to Westinghouse fuel assembly designs and materials, review and potential approval of this supporting topical report will assist the NRC staff in analyzing the likelihood for potential for cladding rupture during a LOCA and what, if any, changes are needed to address such a likelihood in developing the Increased Enrichment Rulemaking and associated guidance documents.

As noted in the regulatory basis, LOCA analyses to date have not accounted for the new phenomenology associated with fuel dispersal. Thus, review and potential approval of all three EPRI topical reports will assist the NRC staff in analyzing FFRD for LOCA events. As such, these topical reports constitute part of the “proof of concept” demonstration for a successful licensing pathway to high burnup fuel, which will assist the NRC staff in addressing Commission direction to address and analyze FFRD for high enrichment or high burnup fuel as part of the Increased Enrichment Rulemaking.

If you have any technical questions regarding this matter, please contact Lois James at 301-415-3306. Please contact Jo Jacobs, of my staff, at 301-415-8388 for any fee-related questions.

Sincerely,



Signed by Barwell, Owen
on 08/01/24

Owen F. Barwell
Chief Financial Officer

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