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October 12, 2022 10 CFR 50.90

RS-22-109

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

LaSalle County Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Subject: Response to Request for Additional Information RE: LaSalle County Station, Units 1 and 2 and Quad Cities Nuclear Power Station, Units 1 and 2 License Amendments Related to Fuel Storage

References:

1. Letter from P.R. Simpson (Exelon Generation Company, LLC) to U.S. NRC, "License Amendment Request Regarding New Fuel Storage Vault and Spent Fuel Storage Pool Criticality Methodologies, with Proposed Changes to Technical Specifications Sections 4.3.1 and 5.6.5," dated June 30, 2021 (ADAMS Accession No. ML21183A169)

2. Email from R. Kuntz (U.S. NRC) to R. Steinman (Constellation Energy Generation), "Request for Additional Information RE: LaSalle County Station, Units 1 and 2 and Quad Cities Nuclear Power Station, Units 1 and 2 License Amendments Related to Fuel Storage," dated September 12, 2022 (ADAMS Accession No. ML22256A011)

3. GEH Report 003N7421-NP/003N7421-P, Revision 1, "Generic Criticality Safety Analysis of GE New Fuel Storage Racks for GNF3 Fuel," dated September 2022 (ADAMS Accession Nos. ML22278A149 (non-proprietary version) ML22278A150 (proprietary version)).

In Reference 1, Constellation Energy Generation, LLC (CEG) requested an amendment to Renewed Facility Operating License Nos. NPF-11 and NPF-18 for LaSalle County Station (LAS) Units 1 and 2. The proposed changes support the transition from Framatome (formerly AREVA) ATRIUM 10XM fuel to Global Nuclear Fuel – Americas, LLC (GNF-A) GNF3 fuel by allowing a different methodology to be used for the criticality safety evaluation for the spent fuel pool (SFP) and the new fuel vault (NFV).

In Reference 2, the NRC requested additional information that is needed to complete review of the proposed methodology change. The attachment provides the additional information requested.

CEG has reviewed the information supporting the finding of no significant hazards

consideration, and the environmental consideration that were previously provided to the NRC in Reference 1. The additional information provided in this submittal does not affect the bases for concluding that the proposed license amendments do not involve a significant hazards consideration. In addition, the information provided in this submittal does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

CEG is notifying the State of Illinois of this supplement to a previous application for a change to the operating license by sending a copy of this letter and its attachments to the designated State Official in accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b).

There are no regulatory commitments included in this letter.

Should you have any questions concerning this letter, please contact Mr. Jason Taken at 630-657-6557.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 12th day of October 2022.

Respectfully,

Lueshen, Kevin

Digitally signed by Lueshen, Kevin
Date: 2022.10.12 09:11:16 -05'00'

Kevin Lueshen
Sr. Manager Licensing
Constellation Energy Generation, LLC

Attachment: Response to Request for Additional Information

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – LaSalle County Station
Illinois Emergency Management Agency – Department of Nuclear Safety

ATTACHMENT 1

Response to Request for Additional Information

REQUEST FOR ADDITIONAL INFORMATION

TO SUPPORT REVIEW OF CRITICALITY SAFETY ANALYSIS THAT SUPPORT

LICENSE AMENDMENT REQUESTS FOR

LASALLE COUNTY STATION, UNITS 1 AND 2, AND

QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2

DOCKET NOS. 50-373, 50-374, 50-254, AND 50-265

By applications dated June 30 and October 25, 2021 (Agencywide Document Access and Management System (ADAMS) Accession Nos. ML21183A169 and ML21298A168), Exelon Generation Company, LLC, submitted similar license amendment requests (LARs) for LaSalle County Station, Units 1 and 2 (LaSalle), and Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities) respectively. The LaSalle LAR was supplemented by letters dated November 4, 2021 (ML21312A457) and June 17, 2022 (ML22172A175). The Quad Cities LAR was supplemented by letters dated November 3, 2021 (ML22194A086), and July 13, 2022 (ML22194A085). On February 1, 2022 (ADAMS Accession No. ML22032A333), Exelon Generation Company, LLC was renamed Constellation Energy Generation, LLC (the licensee). The proposed amendments would allow the licensee to use a new criticality safety analysis (CSA) methodology for GNF3 and legacy fuel types in the spent fuel pool. The proposed amendments would also change the CSA for the new fuel vault (NFV) to use the GESTAR II methodology for the storage of new GNF3 fuel in the NFV racks.

On August 2, 2022 (ML22214A004) the NRC issued a plan for the audit of the LaSalle and Quad Cities, as well as a similar amendment submitted by letter dated June 8, 2022 (ML22159A310) for Dresden Nuclear Power Station, Units 2 and 3. The audit was conducted to increase the NRC staff's understanding of the criticality information. The audit was conducted via virtual discussions and the use of an online portal from August 4 through September 2, 2022.

RAI-SFNB-8

Regulatory Requirements

Paragraph 50.68(a) of Title 10 of the *Code of Federal Regulations* (10 CFR) requires "each holder of a construction permit or operating license for a nuclear power reactor issued under this part or a combined license for a nuclear power reactor issued under Part 52 of this chapter, shall comply with either 10 CFR 70.24 of this chapter or the requirements in paragraph (b) of this section." The licensee has chosen to comply with 10 CFR 50.68(b).

Paragraph 50.68(b)(2) of 10 CFR states: "The estimated ratio of neutron production to neutron absorption and leakage (k-effective) of the fresh fuel in the fresh fuel storage racks shall be calculated assuming the racks are loaded with fuel of the maximum fuel assembly reactivity and flooded with unborated water and must not exceed 0.95, at a 95 percent probability, 95 percent

confidence level. This evaluation need not be performed if administrative controls and/or design features prevent such flooding or if fresh fuel storage racks are not used."

Paragraph 50.68(b)(3) of 10 CFR states: "If optimum moderation of fresh fuel in the fresh fuel storage racks occurs when the racks are assumed to be loaded with fuel of the maximum fuel assembly reactivity and filled with low-density hydrogenous fluid, the k-effective corresponding to this optimum moderation must not exceed 0.98, at a 95 percent probability, 95 percent confidence level. This evaluation need not be performed if administrative controls and/or design features prevent such moderation or if fresh fuel storage racks are not used."

Background

In Section 2.3 of the LARs, the licensee states that the LaSalle and Quad Cities updated final safety analysis reports (UFSARs) will be updated as part of implementation of the amendments. The licensee stated that these updates would include changes to reflect the proposed revisions to the NFV CSA.

By emails dated May 18 (ML22172A175) and June 13 (ML22164A785), 2022, the NRC staff requested, in part, that the licensee provide the following information for LaSalle and Quad Cities, respectively:

- NFV criticality safety analysis methodology used in the analysis.
- Criticality safety analysis that sets the limits for the NFVs.
- Criticality safety analysis that demonstrates GNF3 meets the limits for the NFVs.

The licensee's June 17 and July 13, 2022, letters provided additional information regarding the analysis performed to support the license amendment requests but did not provide the CSA methodology or the CSAs. During the regulatory audit, the NRC staff identified that information needed to support the review was included in a GNF3 fuel design specific NFV criticality safety analysis.

Request

Provide the GNF3 fuel design specific NFV criticality safety analyses that would apply to LaSalle and Quad Cities. Confirm that proposed changes to the UFSARs include incorporating these CSAs (e.g., by reference).

CEG Response

The fuel design specific new fuel vault (NFV) criticality safety analysis for GNF3 fuel is provided in Attachments 2 (non-proprietary version) and 4 (proprietary version) of Reference 3. The fuel-type-specific analysis is applicable for GNF3 fuel stored in GE-designed NFV racks with cell pitches equal to or greater than those shown in Table 1-1, "New Fuel Vault Rack Dimensions" of the referenced reports. The installed LaSalle County Station (LSCS) NFV racks are bounded by Concept 2 dimensions provided in the referenced table. The analysis demonstrates that storage of GNF3 fuel, with maximum cold, uncontrolled in-core eigenvalue (k_{inf}) of 1.31, in the LSCS NFV racks results in a storage rack maximum k-effective within a 95/95 confidence interval ($k_{max(95/95)}$) of less than 0.90 for dry normal storage conditions, and less than 0.95 for credible abnormal operation with tolerances and uncertainties considered.

ATTACHMENT 1

Response to Request for Additional Information

The LSCS Updated Final Safety Analysis Report (UFSAR) will be updated in accordance with 10 CFR 50.71(e) as part of implementation of the approved amendment. In response to this request for information, UFSAR Section 9.1.1.3 will be revised as shown below. Strikeout indicates proposed deletions and underlined text indicates proposed additions to the existing Section 9.1.1.3 text.

9.1.1.3 Safety Evaluation

The design of the new fuel vault storage racks provides for a subcritical multiplication factor K_{eff} of less than 0.90 in a dry condition and less than 0.95 in an abnormal/fully flooded with water condition. These conditions can be met for any GNF3 fuel lattice with k_{inf} in the standard cold core geometry less than or equal to 1.31, which meets the licensing criteria defined by GESTAR (Reference 9). Additional details regarding the NFV criticality safety analysis for GNF3 fuel is found in 003N7421 (Reference 48). ~~For GNF fuel, the new fuel storage vault storage criteria will be satisfied if the uncontrolled lattice k_∞ calculated in the normal reactor core configuration meets the following criteria: K¥ incore (evaluated at 20 degrees Celsius) £ 1.31. Compliance with this criterion ensures that the inrack K_{eff} limits previously described for the dry and flooded conditions will not be exceeded (to a temperature of 100 degrees Celsius) for regular new fuel vault storage racks with an interrack spacing of ≥ 10.50 inches. Calculational uncertainty should be addressed for the new fuel vault if the vault ever becomes limiting for GNF fuel. The GNF2 fuel assembly can be safely stored in the LaSalle Units 1/2 new fuel storage vault and meet the criteria of K_{eff} less than 0.90 dry and 0.95 fully flooded. These conditions will be met (Reference 8), if for enriched lattices in the assembly, the maximum enrichment is 4.7 w/o U-235 and the minimum gadolinia loading is 6 gadolinia rods at 3.0 w/o Gd_2O_3 (face adjacent gadolinia rods are treated as a single gadolinia rod). The use of slightly enriched or natural uranium blankets on the top and/or bottom of the assembly is not credited or required by the new fuel vault criticality analysis. Natural or slightly enriched uranium blankets that are incorporated into the GNF2 design are not required to contain gadolinia rods.~~ Information on radiation monitoring of the new fuel storage vaults is provided in Section 7.6.

In addition, controls have been implemented to further reduce the probability of a criticality occurrence, i.e., the storage array will be in a moderation controlled area. A moderation control area limits the amount of hydrogenous material in the area. Administrative controls as generally defined in SIL 152 (Reference 10) have been incorporated for the area.

ATTACHMENT 1

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REFERENCES

1. Letter from P.R. Simpson (Exelon Generation Company, LLC) to U.S. NRC, "License Amendment Request Regarding New Fuel Storage Vault and Spent Fuel Storage Pool Criticality Methodologies, with Proposed Changes to Technical Specifications Sections 4.3.1 and 5.6.5," dated June 30, 2021 (ADAMS Accession No. ML2183A169)

2. Email from R. Kuntz (U.S. NRC) to R. Steinman (Constellation Energy Generation), "Request for Additional Information RE: LaSalle County Station, Units 1 and 2 and Quad Cities Nuclear Power Station, Units 1 and 2 License Amendments Related to Fuel Storage," dated September 12, 2022 (ADAMS Accession No. ML22256A011)

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