



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

December 28, 2022

Mr. David P. Rhoades
Senior Vice President
Constellation Energy Generation, LLC
President and Chief Nuclear Officer
Constellation Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: LASALLE COUNTY STATION, UNITS 1 AND 2 - ISSUANCE OF
AMENDMENT NOS. 257 AND 243 TO RENEWED FACILITY OPERATING
LICENSES RE: NEW FUEL STORAGE VAULT AND SPENT FUEL
STORAGE POOL CRITICALITY METHODOLOGIES AND CHANGES TO
CORE OPERATING LIMITS REPORT (EPID L-2021-LLA-0124)

Dear Mr. Rhoades:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment Nos. 257 and 243 to Renewed Facility Operating License Nos. NPF-11 and NPF-18 for the LaSalle County Station, Units 1 and 2 (LaSalle), respectively. The amendments consist of changes to the technical specifications (TSs) and Updated Final Safety Analysis Report in response to your application dated June 30, 2021 (Agencywide Documents Access and Management System Accession No. ML21183A169), as supplemented by letters dated November 4, 2021 (ML21312A457), June 17, 2022 (ML22172A176), and October 12, 2022 (ML22285A143).

The amendments revise the criticality safety analysis (CSA) methodology for performing the criticality safety evaluation for legacy fuel types in addition to the Global Nuclear Fuel – Americas, LLC (GNF) GNF3 reload fuel in the LaSalle spent fuel pool. The amendments also change the new fuel vault (NFV) CSA for storing GNF3 fuel in the NFV racks. Finally, the amendments modify the TSs to remove reference to Framatome analytical methods that are no longer used for core operating limits determination.

A copy of the related safety evaluation is also enclosed. A Notice of Issuance will be included in the Commission's monthly *Federal Register* notice.

Sincerely,

/RA/

Robert F. Kuntz, Senior Project Manager
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-373 and 50-374

Enclosures:

1. Amendment No. 257 to NPF-11
2. Amendment No. 243 to NPF-18
3. Safety Evaluation

cc: Listserv



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

CONSTELLATION ENERGY GENERATION, LLC

DOCKET NO. 50-373

LASALLE COUNTY STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 257
Renewed License No. NPF-11

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Constellation Energy Generation, LLC (the licensee) dated June 30, 2021, as supplemented by letters dated November 4, 2021, June 17, 2022, and October 12, 2022, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-11 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 257, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 30 days of the date of issuance. Implementation of the amendment shall also include revision of the Updated Final Safety Analysis Report as described in the licensee's application, as supplemented.

FOR THE NUCLEAR REGULATORY COMMISSION

Nancy L. Salgado, Chief
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed Facility
Operating License and Technical
Specifications

Date of Issuance: December 28, 2022



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

CONSTELLATION ENERGY GENERATION, LLC

DOCKET NO. 50-374

LASALLE COUNTY STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 243
Renewed License No. NPF-18

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Constellation Energy Generation, LLC (the licensee) dated June 30, 2021, as supplemented by letters dated November 4, 2021, June 17, 2022, and October 12, 2022, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-18 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 243, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 30 days of the date of issuance. Implementation of the amendment shall also include revision of the Updated Final Safety Analysis Report as described in the licensee's application, as supplemented.

FOR THE NUCLEAR REGULATORY COMMISSION

Nancy L. Salgado, Chief
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed Facility
Operating License and Technical
Specifications

Date of Issuance: December 28, 2022

ATTACHMENT TO LICENSE AMENDMENT NOS. 257 AND 243

RENEWED FACILITY OPERATING LICENSE NOS. NPF-11 AND NPF-18

LASALLE COUNTY STATION, UNITS 1 AND 2

DOCKET NOS. 50-373 AND 50-374

Replace the following pages of the Renewed Facility Operating Licenses and Appendix A, Technical Specifications, with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Renewed Facility Operating License No. NPF-11

REMOVE
Page 3

INSERT
Page 3

Renewed Facility Operating License No. NPF-18

REMOVE
Page 3

INSERT
Page 3

Technical Specifications

REMOVE
4.0-2
5.6-3
5.6-4

INSERT
4.0-2
5.6-3
5.6-4

- (3) Constellation Energy Generation, LLC, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
- (4) Constellation Energy Generation, LLC, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
- (5) Constellation Energy Generation, LLC, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of LaSalle County Station, Units 1 and 2, and such Class B and Class C low-level radioactive waste as may be produced by the operation of Braidwood Station, Units 1 and 2, Byron Station, Units 1 and 2, and Clinton Power Station, Unit 1.

C. This renewed license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

Am. 198
09/16/10

(1) Maximum Power Level

The licensee is authorized to operate the facility at reactor core power levels not in excess of full power (3546 megawatts thermal).

Am. 257
12/28/22

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 257, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

Am. 194
08/28/09

(3) DELETED

Am. 194
08/28/09

(4) DELETED

Am. 194
08/28/09

(5) DELETED

- (2) Pursuant to the Act and 10 CFR Part 70, to receive, possess and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Safety Analysis Report, as supplemented and amended;
- (3) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
- (4) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
- (5) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of LaSalle County Station, Units 1 and 2, and such Class B and Class C low-level radioactive waste as may be produced by the operation of Braidwood Station, Units 1 and 2, Byron Station, Units 1 and 2, and Clinton Power Station, Unit 1.

C. This renewed license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

Am. 185
09/16/10

(1) Maximum Power Level

The licensee is authorized to operate the facility at reactor core power levels not in excess of full power (3546 megawatts thermal). Items in Attachment 1 shall be completed as specified. Attachment 1 is hereby incorporated into this license.

Am. 243
12/28/22

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 243, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan

4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

- a. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1.2 of the UFSAR.
- b. A nominal 6.26 inch center to center distance between fuel assemblies placed in the storage racks.
- c. For Unit 2 only, spent fuel shall only be stored in storage rack cells containing a neutron absorbing rack insert. The neutron absorbing rack inserts shall have a minimum certified ^{10}B areal density greater than or equal to 0.0086 grams $^{10}\text{B}/\text{cm}^2$. The approved inserts are those described in Attachment 4 to the letter from P. Simpson to the NRC, dated October 5, 2009.
- d. Fuel assemblies having a maximum k_{inf} of 1.275 in the normal reactor core configuration at cold conditions.

(continued)

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

4. The Rod Block Monitor Upscale Instrumentation Setpoint for the Rod Block Monitor–Upscale Function Allowable Value for Specification 3.3.2.1.
5. The OPRM setpoints for the trip function for SR 3.3.1.3.3.
- b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

(continued)

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

- 1. NEDE-24011-P-A, "General Electric Standard Application
 for Reactor Fuel."

(continued)



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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NOS. 257 AND 243 TO RENEWED
FACILITY OPERATING LICENSE NOS. NPF-11 AND NPF-18
CONSTELLATION ENERGY GENERATION, LLC
LASALLE COUNTY STATION, UNITS 1 AND 2
DOCKET NOS. 50-373 AND 50-374

1.0 INTRODUCTION

By letter to the U.S. Nuclear Regulatory Commission (NRC, the Commission) dated June 30, 2021 (Agencywide Documents Access and Management System Accession No. ML21183A169), as supplemented by letter dated November 4, 2021 (ML21312A457), Exelon Generation Company, LLC submitted a request for amendments to the technical specifications (TSs) and Updated Final Safety Analysis Report (UFSAR) for LaSalle County Station, Units 1 and 2 (LaSalle). On February 1, 2022 (ML22032A333), Exelon Generation Company, LLC was renamed Constellation Energy Generation, LLC (Constellation, the licensee). Subsequent to this name change, Constellation supplemented the original license amendment request (LAR) by letters dated June 17, 2022 (ML22172A176), and October 12, 2022 (ML22285A143). Specifically, the LAR, as supplemented, proposed a new criticality safety analysis (CSA) methodology for performing the criticality safety evaluation for legacy fuel types in addition to the Global Nuclear Fuel – Americas, LLC (GNF) GNF3 reload fuel in the LaSalle spent fuel pool (SFP). The LAR initially proposed a change to the new fuel vault (NFV) CSA to utilize the GESTAR II methodology. An NRC staff audit of the GESTAR II CSA methodology revealed that there is not an NRC-approved GESTAR II CSA methodology. Subsequently, the licensee submitted a CSA for storing GNF3 fuel in the LaSalle NFV. The amendments would also revise the TSs to remove reference to Framatome analytical methods that are no longer used for core operating limits determination.

The supplemental letters dated June 17, 2022, and October 12, 2022, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on April 5, 2022 (87 FR 19715).

2.0 REGULATORY EVALUATION

2.1 Description of Proposed Changes

The LaSalle renewed licenses do not have TSs for the NFV. The June 30, 2021, letter initially proposed changes to the UFSAR to reflect the proposed revised NFV CSA to use the GESTAR II methodology. The October 12, 2022, letter submitted a new CSA to support storing GNF3 fuel in the LaSalle NFV. The June 30, 2021, letter stated that optimum moderation is prevented in the NFV. The June 17, 2022, letter provided supplemental information regarding that statement.

The LAR, as supplemented, also proposed a change to LaSalle TS 4.3, "Fuel Storage," 4.3.1, "Criticality," design feature 4.3.1.1.d to change the SFP storage criteria from a SFP k-infinity (abbreviated k_{inf} in the TS) of 0.9185 to a maximum k-infinity of 1.275 in the normal reactor core configuration at cold conditions (also known as the standard cold core geometry (SCCG) k-infinity). The June 30, 2021, letter contained a CSA supporting the requested TS change. The November 4, 2021, letter submitted a revised CSA and supplemental information. The June 17, 2022, and October 12, 2022, letters included supplemental information to support storing GNF3 fuel in the LaSalle SFP.

LaSalle TS 5.6.5, "Core Operating Limits Report (COLR)," item 5.6.5.b. includes the analytical methods used to determine the core operating limits. The LAR requested the removal of the analytical methods related to Framatome fuel, which no longer remains in the LaSalle operating core. Consistent with this change, the LAR also proposed to remove reference to Framatome methods in TS 4.3.1.1.a.

2.2 Applicable Regulatory Requirements and Guidance

2.2.1 Regulatory Requirements

Paragraph 50.68(a) of Title 10 of the *Code of Federal Regulations* (10 CFR) states, in part, that "Each holder of a construction permit or operating license for a nuclear power reactor issued under this part ... shall comply with either 10 CFR 70.24 of this chapter or the requirements in paragraph (b) of this section." With respect to LaSalle, the licensee has chosen to comply with 10 CFR 50.68(b).

Paragraph 50.68(b)(1) of 10 CFR states that "Plant procedures shall prohibit the handling and storage at any one time of more fuel assemblies than have been determined to be safely subcritical under the most adverse moderation conditions feasible by unborated water."

Paragraph 50.68(b)(2) of 10 CFR states that "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 that "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.”

Paragraph 50.68(b)(4) of 10 CFR states, in part, that “If no credit for soluble boron is taken, the k-effective of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with unborated water.” Paragraph 50.68(b)(4) of 10 CFR additionally provides requirements for when credit is taken for soluble boron; however, the LaSalle SFP nuclear criticality safety (NCS) analysis does not take credit for soluble boron and, therefore, those requirements do not apply.

In addition, 10 CFR 50.36(c)(4), “Design features,” states that “Design features to be included are those features of the facility such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety and are not covered in categories described in paragraphs (c) (1), (2), and (3) of this section.”

Paragraph 50.36(c)(5), “Administrative controls,” states that “Administrative controls are the provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure the operation of the facility in a safe manner.” This includes the programs established by the licensee and listed in the administrative controls section of the TSs for the licensee to operate the facility in a safe manner.

LaSalle was licensed to the 10 CFR part 50, “Domestic Licensing of Production and Utilization Facilities,” appendix A, “General Design Criteria for Nuclear Power Plants,” general design criteria (GDC). GDC 62, “Prevention of criticality in fuel storage and handling,” states that “Criticality in the fuel storage and handling system shall be prevented by physical systems or processes, preferably by use of geometrically safe configurations.”

2.2.2 Guidance

Regulatory Guide (RG) 1.240, “Fresh and Spent Fuel Pool Criticality Analyses” (ML20356A127), describes an approach that the NRC staff considers acceptable to demonstrate that regulatory requirements are met for subcriticality of fuel assemblies stored in fresh fuel vaults and SFPs at light-water reactor power plants. It endorses, with clarifications and exceptions, the Nuclear Energy Institute (NEI) guidance document NEI 12-16, “Guidance for Performing Criticality Analyses of Fuel Storage at Light-Water Reactor Power Plants,” Revision 4 (ML19269E069). The LAR stated that NEI 12-16, Revision 4, was used in its preparation.

NUREG/CR-6698, “Guide for Validation of Nuclear Criticality Safety Calculational Methodology” (ML050250061), provides guidance for performing criticality safety analyses.

3.0 TECHNICAL EVALUATION

The NRC staff reviewed the LAR, as supplemented, to determine whether the proposed revised CSAs for the LaSalle NFV and SFP meet the requirements in 10 CFR 50.68. The CSA for storing GNF3 in the LaSalle SFP is provided in GNF NEDC-33931P, “LaSalle County Station Fuel Storage Criticality Safety Analysis,” Revision 1, October 2021, Attachment 2 to the November 4, 2021, letter (the non-proprietary version of this analysis, NEDO-33931, is provided in attachment 3 to this letter), as supplemented by the June 17, 2022, letter. The CSA for storing GNF3 in the LaSalle NFV is provided in GE Hitachi Nuclear Energy (GEH) 003N7421-P, “Generic Criticality Safety Analysis of GE New Fuel Storage Racks for GNF3 Fuel,” Revision 1,

September 2022, as referred to by the October 12, 2022, letter. This analysis is provided in Attachment 4 to a Constellation letter dated October 5, 2022 (ML22278A149) (the non-proprietary version of this analysis, GEH 003N7421-NP, is provided in Attachment 2 to this letter).

3.1 Computer Code Versions and Applications

The LAR analyses use TGBLA06 for in-core calculations and MCNP-05P for in-rack calculations.

TGBLA06 is a lattice physics computer code that calculates the exposure dependent pin-by-pin isotopic specifications used in developing the design basis lattice for the SFP CSA, but also has application to many other GEH/GNF analysis methods. Letter from S. Richards, NRC, to G. Watford, GE Nuclear Energy, "Amendment 26 to GE Licensing Topical Report NEDE-24011-P-A, 'GESTAR II' - Implementing Improved GE Steady-State Methods (TAC No. MA6481)," dated November 10, 1999 (ML993230184), documents the NRC's original acceptance of TGBLA06 and its associated application methodology. This initial approval was updated to address the applicability to the GNF3 product line in a letter from B. Moore, GNF – Americas, LLC, to the NRC, "Administrative Amendment 49 to NEDE-24011-P-A-27, General Electric Standard Application for Reactor Fuel (GESTAR II)," dated October 1, 2018 (ML18274A195). Based on the prior NRC review and approval of TGBLA06 for depletion and reactivity calculations, the NRC staff found the use of this code for the purpose described in the LAR analyses to be acceptable.

The Monte Carlo N-Particle (MCNP) computer code can be used for the general-purpose transport of many particles including neutrons, photons, electrons, ions, and many other elementary particles. MCNP is developed, maintained, and distributed by the Los Alamos National Laboratory. MCNP-05P is the GEH/GNF proprietary version of MCNP5. MCNP-05P is a Monte Carlo program for solving the linear neutron transport equation for a fixed source or an eigenvalue problem. The code implements the Monte Carlo process for neutron, photon, electron, or coupled transport involving all these particles, and computes the eigenvalue for neutron-multiplying systems. For the LaSalle NFV and SFP CSAs only neutron transport is considered. Based on the generally accepted use of MCNP for neutron transport calculations and the CSA-specific validation described below, the NRC staff found the use of this code for the purpose described in the LAR analyses to be acceptable.

3.2 Computer Code Validation

The purpose of the computer code validation is to ensure that appropriate code bias and bias uncertainty are determined for use in the criticality calculation. The licensee followed NEI 12-16, Revision 4, guidance for determining the depletion uncertainty for TGBLA06. The licensee followed NUREG/CR-6698 to validate and determine a code bias and bias uncertainty for MCNP-05P. Using NUREG/CR-6698 to validate the Monte Carlo code is consistent with NEI 12-16, Revision 4. Both are consistent with the endorsement in RG 1.240 of NEI 12-16, Revision 4, and, therefore, the NRC staff found the validation to be acceptable.

3.3 New Fuel Vault

Paragraph 50.68(b) of 10 CFR has two subparagraphs that address the storage of fuel in the NFV. Both are accident driven as the NFV is dry/unmoderated. Paragraph 50.68(b)(2) of 10 CFR addresses the scenario should the NFV become fully flooded. Paragraph 50.68(b)(3) of 10 CFR addresses the scenario should the NFV be the subject of an optimum moderation condition. Typically, the source of the optimum moderation is assumed to be firefighting water or aqueous foam from firefighting efforts in the building housing the NFV. If the building housing the NFV is susceptible to environmental damage, that could be another source of moderating medium.

With respect to the fully flooded scenario, the June 30, 2021, letter stated that the LaSalle NFV CSA methodology was being changed to that in GESTAR II and cited references. This letter also stated that there was a GNF3 GESTAR II NFV CSA validation report, again citing references. However, the cited references did not contain an NFV GESTAR II methodology or a GNF3 GESTAR II NFV CSA validation report. The June 17, 2022, letter did not provide this methodology or validation report. To expedite its review, the NRC staff conducted a virtual audit of GESTAR II's NFV criticality coverage. That audit was held from August 4, 2022, until September 2, 2022 (a report of the audit activities is available at ML22300A253). The audit revealed that there is no NRC-approved GESTAR II NFV or SFP CSA methodology. The audit also revealed that there is a generic GNF3 NFV CSA covering storage of GNF3 in GE-designed NFV racks, but that that CSA hadn't previously been made available to the NRC. The October 12, 2022, letter referred to the generic GNF3 NFV CSA covering storage of GNF3 in GE-designed NFV racks (GEH 003N7421-P), which had since been submitted to the NRC by a Constellation letter dated October 5, 2022 (ML22278A149).

The CSA for storing GNF3 in the LaSalle NFV is provided in GEH 003N7421-P. The analysis is generic and is based on demonstrating that GNF3 fuel with a maximum cold, uncontrolled peak in-core (otherwise known as SCCG) k-infinity of 1.31 will satisfy 10 CFR 50.68(b)(2) when stored in either of two GE rack types. As long as a particular licensee has one of the two GE rack types and meets the cell pitch listed in GEH 003N7421-P, table 1-1, "New Fuel Vault Rack Dimensions," then the analysis would be representative of the applicable NFV.

The NFV CSA is a fresh fuel analysis with the SCCG calculated using TGBLA06. As a fresh fuel analysis, core depletion impact is not a factor. With the fuel design set as GNF3, the SCCG is essentially set by a combination of Uranium-235 enrichment and gadolinia loading. The fuel design identified by TGBLA06 is then modeled in the NFV storage racks with MCNP-05P to calculate the in-rack k-infinity. It is the in-rack k-infinity that is used to demonstrate compliance with 10 CFR 50.68(b)(2). The licensee checks each fuel assembly's peak lifetime reactivity against the SCCG k-infinity of 1.31. Therefore, establishing the relationship between the fuel assembly's maximum cold, uncontrolled peak in-core k-infinity and its in-rack k-infinity is required. GEH 003N7421-P establishes that relationship by calculating a rack efficiency for each fuel design.

GEH 003N7421-P calculated an in-rack k-infinity of 0.93919 at a 95 percent probability, 95 percent confidence level for a fresh GNF3 fuel assembly with a SCCG k-infinity of 1.31. This represents 0.01 Δk -effective of margin to the regulatory limit of 0.95 in 10 CFR 50.68(b)(2). The NRC staff considered this margin in its review to apply engineering judgement to the depth of the review on items unlikely to challenge the margin.

The NRC staff used RG 1.240 to review the analysis in GEH 003N7421-P. RG 1.240 provides guidance for salient aspects of an NFV CSA such as: determining the reactivity effects of fuel assembly manufacturing tolerances and rack tolerances; evaluating potential biases such as fuel assembly eccentricity within the rack storage cells; and selecting representative fuel assembly designs for the licensee's total inventory. The information provided in GEH 003N7421-P indicates that these topics were treated in a manner consistent with the guidance. The NRC staff determined that the Information provided in GEH 003N7421-P, along with the margin in the analysis of 0.01 Δk -effective, provide reasonable assurance that the requirements in 10 CFR 50.68(b)(2) will be met.

With respect to the 10 CFR 50.68(b)(3) optimum moderation scenario, the June 30, 2021, letter stated that "The optimum moderation case is not applicable to LaSalle's NFV as it is a moderation controlled area (see Section 9.1.1.3 of the [LaSalle] UFSAR)." The NRC staff notes that 10 CFR 50.68(b)(3) still applies even if a licensee has administrative controls and/or design features to prevent such moderation; however, the method of compliance changes from an analysis and operation in accordance with that analysis that demonstrates sufficient sub-critical margin to the maintenance of the administrative controls and/or design features and operation within those. Regardless, the NRC staff determined that the optimum moderation scenario is outside the scope of the LAR.

GEH 003N7421-P contains analyses for a fully flooded and an optimum moderated NFV. As noted, the optimum moderated scenario was considered out of scope for this LAR. Therefore, the NRC staff did not review that portion of GEH 003N7421-P and makes no determination regarding the optimum moderation scenario. As discussed above, the NRC staff finds the CSA for the fully flooded NFV to be acceptable to demonstrate compliance with the applicable 10 CFR 50.68 regulations based on consistency with NRC regulatory guidance and a technically justified approach.

3.4 Spent Fuel Pool

Paragraph 50.68(b) of 10 CFR has one subparagraph that addresses storage of fuel in the SFP. Paragraph 50.68(b)(4) of 10 CFR states, in part, that "If no credit for soluble boron is taken, the k-effective of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with unborated water." Paragraph 50.68(b)(4) of 10 CFR additionally provides requirements for when credit is taken for soluble boron; however, the LaSalle SFP NCS analysis does not take credit for soluble boron and, therefore, those requirements do not apply. There is no optimum moderation paragraph for SFPs since TS 4.3.2, "Drainage," ensures a minimum water level in the SFP providing reasonable assurance that an optimum moderation will not occur.

The CSA for storing GNF3 in the LaSalle SFP is provided in NEDC-33931P. The analysis is specific to the LaSalle SFP demonstrating that GNF3 fuel with a maximum cold, uncontrolled peak in-core (SCCG) k-infinity of 1.275 will satisfy 10 CFR 50.68(b)(4). The analysis includes consideration for LaSalle legacy fuel, stating that the legacy fuel is bounded by the analysis in NEDC-33931P.

The SFP CSA is an irradiated fuel analysis with the SCCG calculated using TGBLA06. As an irradiated fuel analysis, the core depletion impact is a significant factor. In addition to the fuel design, Uranium-235 enrichment, and gadolinia loading, the reactor operating conditions while the fuel is being used will impact its reactivity.

The fuel design with a specified Uranium-235 enrichment and gadolinia loading is modeled by TGBLA06 over a range of reactor operating parameters. The irradiated fuel assembly is then modeled with MCNP-05P to calculate the in-rack k-infinity. This can be an iterative process until the licensee finds a solution that meets the regulatory requirement and any other needs it might have. Only the final set of analyses are provided in the LAR.

As with the NFV analyses, the SFP in-rack k-infinity is used to demonstrate compliance with 10 CFR 50.68(b)(4). The licensee checks each fuel assembly's peak lifetime reactivity against the SCCG k-infinity of 1.275. Therefore, establishing the relationship between the fuel assembly's maximum cold, uncontrolled peak in-core k-infinity and its in-rack k-infinity is required. NEDC-33931P establishes that relationship by calculating a rack efficiency for each fuel design.

NEDC-33931P calculated an in-rack k-infinity of 0.89232 and 0.93900 for LaSalle, Unit 1 and Unit 2, respectively, at a 95 percent probability, 95 percent confidence level for an irradiated GNF3 fuel assembly with a SCCG k-infinity of 1.275. This represents 0.011 Δk -effective of margin to the regulatory limit in 10 CFR 50.68(b)(4). The NRC staff considered this margin in its review to apply engineering judgement to the depth of the review on items unlikely to challenge the margin.

The NRC staff used RG 1.240 to review the analysis in NEDC-33931P. RG 1.240 provides guidance for salient aspects of an SPF CSA such as: modeling depletion parameters and uncertainty; determining the reactivity effects of fuel assembly manufacturing tolerances and rack tolerances; evaluating potential biases such as fuel assembly eccentricity within the rack storage cells; and selecting representative fuel assembly designs for the licensee's total inventory. Many of the general steps are the same between an unirradiated and irradiated CSA, but the irradiated CSA is typically more detailed due to the additional complexity of the fuel's depletion in the reactor during operation. The information provided in NEDC-33931P indicates that these topics were treated in a manner consistent with the guidance. The NRC staff determined that the information provided in NEDC-33931P, along with the margin in the analysis of 0.011 Δk -effective, provide reasonable assurance that the requirements in 10 CFR 50.68(b)(4) will be met. Therefore, the NRC staff found the licensee's justification for the proposed TS 4.3.1.1.d change to be acceptable and that 10 CFR 50.36(c)(4) will continue to be met.

3.5 Revised Criticality Safety Analyses Conclusion

The NRC staff finds the CSA for the fully flooded NFV and the CSA for storing GNF3 in the LaSalle SFP to be acceptable to demonstrate compliance with the applicable 10 CFR 50.68 regulations based on consistency with NRC regulatory guidance and a technically justified approach.

The licensee has provided reasonable assurance that a GNF3 fuel assembly with a peak SCCG of 1.31 k-infinity will comply with 10 CFR 50.68(b)(2). The licensee has also provided reasonable assurance that a GNF3 fuel assembly with a peak SCCG of 1.275 k-infinity will comply with 10 CFR 50.68(b)(4). Therefore, 10 CFR Part 50, appendix A, GDC 62 will continue to be met.

The NRC staff notes that the difference in the two peak SCCG k-infinity numbers means that fuel that is acceptable for storage in the NFV is not acceptable for storage in the SFP unless it also meets the peak SCCG of 1.275 k-infinity for the SFP.

The licensee has provided an acceptable justification for the proposed TS 4.3.1.1.d change, thereby satisfying 10 CFR 50.36(c)(4).

3.6 Technical Specifications Changes Regarding Framatome References

The LAR proposed changes to TS 4.3.1.1.a and TS 5.6.5 to remove references to the methods for evaluating Framatome fuel. The NRC staff evaluated the changes and determined that the methods are not required to be included in the LaSalle TSs because Framatome fuel is no longer located in the LaSalle core. Therefore, the NRC staff finds the proposed changes to be acceptable and that TS 4.3.1.1.a will continue to meet the requirements of 10 CFR 50.36(c)(4) and that TS 5.6.5 will continue to meet the requirements of 10 CFR 50.36(c)(5).

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Illinois State official was notified of the proposed issuance of the amendments on December 2, 2022. The State official had no comments

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change the requirements with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding published in the *Federal Register* on April 5, 2022 (87 FR 19715). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Kent Wood, NRR

Date of Issuance: December 28, 2022

SUBJECT: LASALLE COUNTY STATION, UNITS 1 AND 2 - ISSUANCE OF
AMENDMENT NOS. 257 AND 243 TO RENEWED FACILITY OPERATING
LICENSES RE: NEW FUEL STORAGE VAULT AND SPENT FUEL
STORAGE POOL CRITICALITY METHODOLOGIES AND CHANGES TO
CORE OPERATING LIMITS REPORT (EPID L-2021-LLA-0124) DATED
DECEMBER 28, 2022

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