



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

November 29, 2016

Mr. Bryan C. Hanson
President and Chief Nuclear Officer
Exelon Generation Company, LLC
Oyster Creek Nuclear Generating Station
Nine Mile Point Nuclear Station, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: OYSTER CREEK NUCLEAR GENERATING STATION AND NINE MILE POINT NUCLEAR STATION, UNIT 1 - ISSUANCE OF AMENDMENTS REGARDING CHANGES TO THE "SAFETY LIMIT – FUEL CLADDING INTEGRITY" SECTION OF THE TECHNICAL SPECIFICATIONS TO REDUCE THE REACTOR STEAM DOME PRESSURE (CAC NOS. MF8220 AND MF8265)

Dear Mr. Hanson:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 289 to Renewed Facility Operating License DPR-16 for the Oyster Creek Nuclear Generating Station (OCNGS), and Amendment No. 225 to Renewed Facility Operating License DPR-63 for the Nine Mile Point Nuclear Station, Unit 1 (NMP1), in response to your application dated August 1, 2016 (Agencywide Documents Access and Management System Accession No. ML16215A128).

The amendments revise Technical Specification (TS) Section 2.1, "Safety Limit – Fuel Cladding Integrity," for OCNGS and TS Section 2.1.1, "Fuel Cladding Integrity," for NMP1 to reduce the reactor steam dome pressure. The change addresses a Title 10 of the *Code of Federal Regulations* Part 21, "Reporting of Defects and Noncompliance," issue concerning the potential to violate the safety limits during a pressure regulator failure maximum demand (open) transient.

B. Hanson

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A copy of the related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

A handwritten signature in black ink, appearing to read "John G. Lamb". The signature is written in a cursive style with a large initial "J".

John G. Lamb, Senior Project Manager
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-219 and 50-220

Enclosures:

1. Amendment No. 289 to DPR-16
2. Amendment No. 225 to DPR-63
3. Safety Evaluation

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

EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-219

OYSTER CREEK NUCLEAR GENERATING STATION

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 289
Renewed License No. DPR-16

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Exelon Generation Company, LLC (the licensee), dated August 1, 2016, 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. DPR-16 is hereby amended to read as follows:

- (2) Technical Specifications

- The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 289, are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Douglas A. Broaddus, Chief
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the License and
Technical Specifications

Date of Issuance: November 29, 2016

ATTACHMENT TO LICENSE AMENDMENT NO. 289
TO RENEWED FACILITY OPERATING LICENSE NO. DPR-16
OYSTER CREEK NUCLEAR GENERATING STATION
DOCKET NO. 50-219

Replace the following page of the Renewed Facility Operating License with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

REMOVE
-3-

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Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Remove
2.1-1

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2.1-1

- (3) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source, or 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 materials 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, source, or special nuclear materials as may be produced by the operation of the facility.

C. This 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:

(1) Maximum Power Level

Exelon Generation Company is authorized to operate the facility at steady-state power levels not in excess of 1930 megawatts (thermal) (100 percent rated power) in accordance with the conditions specified herein.

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 289, are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications.

(3) Fire Protection

Exelon Generation Company shall implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report for the facility and as approved in the Safety Evaluation Report dated March 3, 1978, and supplements thereto, subject to the following provision:

The licensee may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

SECTION 2

SAFETY LIMITS AND LIMITING SAFETY SYSTEM SETTINGS

2.1 SAFETY LIMIT - FUEL CLADDING INTEGRITY

Applicability: Applies to the interrelated variables associated with fuel thermal behavior.

Objective: To establish limits on the important thermal hydraulic variables to assure the integrity of the fuel cladding.

Specifications:

- A. When the reactor pressure is greater than or equal to 700 psia and the core flow is greater than or equal to 10% of rated, the existence of a minimum CRITICAL POWER RATIO (MCPR) less than 1.10 for both four or five loop operation and 1.12 for three loop operation shall constitute violation of the fuel cladding integrity safety limit. |
- B. When the reactor pressure is less than 700 psia or the core flow is less than 10% of rated, the core THERMAL POWER shall not exceed 25% of RATED THERMAL POWER. |
- C. In the event that reactor parameters exceed the limiting safety system settings in Specification 2.3 and a reactor scram is not initiated by the associated protective instrumentation, the reactor shall be brought to, and remain in, the COLD SHUTDOWN CONDITION until an analysis is performed to determine whether the safety limit established in Specification 2.1.A and 2.1.B was exceeded.
- D. During all modes of reactor operation with irradiated fuel in the reactor vessel, the water level shall not be less than 4'8" above the TOP OF ACTIVE FUEL.



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

NINE MILE POINT NUCLEAR STATION, LLC

EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-220

NINE MILE POINT NUCLEAR STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 225
Renewed License No. DPR-63

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Exelon Generation Company, LLC (Exelon, the licensee) dated August 1, 2016, 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. DPR-63 is hereby amended to read as follows:

- (2) Technical Specifications

- The Technical Specifications contained in Appendix A, which is attached hereto, as revised through Amendment No. 225, is hereby incorporated into this license. Exelon Generation shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Richard V. Guzman, Acting Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the License and
Technical Specifications

Date of Issuance: November 29, 2016

ATTACHMENT TO LICENSE AMENDMENT NO. 225
TO RENEWED FACILITY OPERATING LICENSE NO. DPR-63
NINE MILE POINT NUCLEAR STATION, UNIT 1
DOCKET NO. 50-220

Replace the following page of the Renewed Facility Operating License with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

REMOVE
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Replace the following page of Appendix A, Technical Specifications, with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

REMOVE
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- (2) Exelon Generation 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) Exelon Generation 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) Exelon Generation 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 and equipment calibration or associated with radioactive apparatus or components.
- (5) Exelon Generation pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I:

Part 20, Section 30.34 of Part 30; Section 40.41 of Part 40; Section 50.54 and 50.59 of Part 50; and Section 70.32 of Part 70. This renewed license 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 also subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 1850 megawatts (thermal).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, which is attached hereto, as revised through Amendment No. 225, is hereby incorporated into this license. Exelon Generation shall operate the facility in accordance with the Technical Specifications.

(3) Deleted

SAFETY LIMIT

2.1.1 FUEL CLADDING INTEGRITY

Applicability:

Applies to the interrelated variables associated with fuel thermal behavior.

Objective:

To establish limits on the important thermal-hydraulic variables to assure the integrity of the fuel cladding.

Specification:

- a. When the reactor pressure is greater than 700 psia and the core flow is greater than 10%, the existence of a Minimum Critical Power Ratio (MCPR) less than the Safety Limit Critical Power Ratio (SLCPR) (Reference 12) shall constitute violation of the fuel cladding integrity safety limit.
- b. When the reactor pressure is less than or equal to 700 psia or core flow is less than 10% of rated, the core power shall not exceed 25% of rated thermal power.

LIMITING SAFETY SYSTEM SETTING

2.1.2 FUEL CLADDING INTEGRITY

Applicability:

Applies to trip settings on automatic protective devices related to variables on which the fuel loading safety limits have been placed.

Objective:

To provide automatic corrective action to prevent exceeding the fuel cladding safety limits.

Specification:

Fuel cladding limiting safety system settings shall be as follows:

- a. The flow-biased APRM scram and rod block trip settings shall be established according to the following relationships:

The minimum of:

For $W \geq 0\%$:

$$S \leq (0.55W + 67\%)T \text{ with a maximum value of } 122\%$$

$$S_{RB} \leq (0.55W + 62\%)T \text{ with a maximum value of } 117\%$$



UNITED STATES
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 289 TO

RENEWED FACILITY OPERATING LICENSE NO. DPR-16

AND AMENDMENT NO. 225 TO

RENEWED FACILITY OPERATING LICENSE NO. DPR-63

EXELON GENERATION COMPANY, LLC

OYSTER CREEK NUCLEAR GENERATING STATION AND

NINE MILE POINT NUCLEAR STATION, UNIT 1

DOCKET NO. 50-219

1.0 INTRODUCTION

By application dated August 1, 2016 (Reference 1), Exelon Generation Company, LLC (Exelon or the licensee) submitted a license amendment request (LAR) for Oyster Creek Nuclear Generating Station (OCNGS) and Nine Mile Point Nuclear Station, Unit 1 (NMP1).

The amendments revise Technical Specification (TS) Section 2.1, "Safety Limit – Fuel Cladding Integrity," for OCNGS and TS Section 2.1.1, "Fuel Cladding Integrity," for NMP1 to reduce the reactor steam dome pressure. The change addresses a Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," issue concerning the potential to violate the safety limits during a pressure regulator failure maximum demand (PRFO) (open) transient.

2.0 REGULATORY EVALUATION

2.1 Background

OCNGS TS 2.1 and NMP1 TS 2.1.1 currently require that when steam dome pressure is less than 800 pounds per square inch absolute (psia) (approximately 785 pounds per square inch gauge (psig)), or core flow is less than 10 percent of rated core flow, thermal power shall be less than or equal to 25 percent of rated thermal power (RTP). In a letter dated March 29, 2005 (Reference 2), General Electric (GE) submitted a 10 CFR Part 21 notification to the U.S. Nuclear Regulatory Commission (NRC). The 10 CFR Part 21 notification discussed how applying newer computer analysis codes to a PRFO transient could result in a condition where the reactor steam dome pressure could momentarily decrease below 785 psig, while RTP was above the plant-

specific thermal power limit specified in TS 2.1 for OCNGS or TS 2.1.1 for NMP1. As such, this condition would result in a violation of the reactor core safety limit in TS 2.1 for OCNGS or TS 2.1.1 for NMP1. The notification indicated that a number of boiling-water reactor (BWR) plants, including OCNGS and NMP1, were affected. Initially, the Boiling-Water Reactor Owners Group (BWROG) attempted to resolve the 10 CFR Part 21 issue. On July 18, 2006, the Technical Specifications Task Force (TSTF) and the BWROG submitted Improved Standard Technical Specifications Change Traveler TSTF-495, Revision 0, "Bases Change to Address GE Part 21 SC05-03" (Reference 3), to the NRC for review. The letter stated, in part, that "TSTF-495 only affects the Technical Specification Bases and may be adopted by plants without requesting a license amendment from the NRC." Specifically, the proposed change would modify the "Applicable Safety Analysis" portion of the TS Bases for TS 2.1.1, "Reactor Core SLs [Safety Limits]." This change proposed to clarify that the safety limit was considered not to apply to momentary depressurization transients. In a letter to the TSTF dated August 27, 2007 (Reference 4), the NRC staff stated that TSTF-495, Revision 0, could not be approved. The NRC staff's safety evaluation (SE) enclosed with the letter stated, in part:

The staff agrees with the applicant's position that the PRFO transient does not threaten fuel cladding integrity, since the margin to SLMCPR [safety limit minimum critical power ratio] increases with decreasing reactor pressure. However, the staff is concerned that in some depressurization events which occur at or near full power, there may be enough bundle stored energy to cause some fuel damage. If a reactor scram does not occur automatically, the operator may have insufficient time to recognize the condition and to take the appropriate actions to bring the reactor to a safe configuration.

Based on the above considerations, the NRC staff's SE concluded that TSTF-495, Revision 0, was unacceptable. Consequently, the BWROG discontinued the effort to resolve the issue generically. Several approaches to resolve this issue were considered at periodic BWROG meetings but not adopted, because a generic approach applicable to all BWROG members and fuel vendors could not be identified.

Subsequently, affected BWR licensees have proposed resolution of the Part 21 issue on a plant-specific basis by submittal of LARs that lower the reactor steam dome pressure safety limit value in the TSs. This approach takes advantage of the fact that some advanced fuel designs have an NRC-approved critical power correlation with a lower-bound pressure significantly below the reactor steam dome pressure specified in TS 2.1.1. With respect to OCNGS and NMP1, the licensee proposes to utilize this approach and reduce the reactor steam dome pressure, consistent with the approved lower-bound pressure for the critical power correlation for the Global Nuclear Fuel (GNF) GNF2 fuel currently used in the OCNGS and NMP1 cores.

2.2 Proposed TS Changes

Consistent with the approach discussed above in Section 2.1 of this SE, the licensee proposes to reduce the reactor steam dome pressure specified in TS 2.1.A and TS 2.1.B for OCNGS and 2.1.1.a and TS 2.1.1.b for NMP1 from 785 psig (~800 psia) to 700 psia.

The revised TSs would read as follows for OCNGS:

- 2.1.A. When the reactor pressure is greater than or equal to 700 psia and the core flow is greater than or equal to 10% of rated, the existence of a minimum CRITICAL POWER RATIO (MCPR) less than 1.10 for both four or five loop operation and 1.12 for three loop operation shall constitute violation of the fuel cladding integrity safety limit.
- 2.1.B. When the reactor pressure is less than 700 psia or the core flow is less than 10% of rated, the core THERMAL POWER shall not exceed 25% of RATED THERMAL POWER.

The revised TSs would read as follows for NMP1:

- 2.1.1.a. When the reactor pressure is greater than 700 psia and the core flow is greater than 10%, the existence of a Minimum Critical Power Ratio (MCPR) less than the Safety Limit Critical Power Ratio (SLCPR) (Reference 12) shall constitute violation of the fuel cladding integrity safety limit.
- 2.1.1.b. When the reactor pressure is less than or equal to 700 psia or core flow is less than 10% of rated, the core power shall not exceed 25% of rated thermal power.

2.3 Regulatory Requirements and Guidance

The regulatory requirements and guidance that the NRC staff considered in its review of this LAR are described below.

General Design Criteria

The construction permit for OCNGS was issued by the Atomic Energy Commission (AEC) on December 15, 1964. As discussed in Chapter 3 of the OCNGS Updated Final Safety Analysis Report (UFSAR), during the construction/licensing process, OCNGS was evaluated against the then-current AEC draft of the 27 General Design Criteria (GDC) issued in November 1965.

The construction permit for NMP1 was issued by the AEC on April 12, 1965. As discussed in Chapter 1 of the NMP1 (UFSAR), during the construction/licensing process, NMP1 was evaluated against the then-current AEC draft of the 27 GDC issued in November 1965.

On July 11, 1967, the AEC published, for public comment in the *Federal Register* (32 FR 10213), a revised and expanded set of 70 draft GDC (hereinafter referred to as the "draft GDC"). Chapter 3 of the OCNGS UFSAR and Chapter 1 of NMP1 contains an evaluation of the design basis of OCNGS and NMP1 against the draft GDC. The licensee concluded that OCNGS and NMP1 conform to the intent of the draft GDC.

On February 20, 1971, the AEC published in the *Federal Register* (36 FR 3255) a final rule that added Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants"

(hereinafter referred to as the "final GDC"). Differences between the draft GDC and final GDC include a consolidation from 70 to 64 criteria. As discussed in the NRC's Staff Requirements Memorandum for SECY-92-223, "Resolution of Deviations Identified during the Systematic Evaluation Program," dated September 18, 1992 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML003763736), the Commission decided not to apply the final GDC to plants with construction permits issued prior to May 21, 1971. At the time of promulgation of Appendix A to 10 CFR Part 50, the Commission stressed that the final GDC were not new requirements and were promulgated to more clearly articulate the licensing requirements and practice in effect at that time. Each plant licensed before the final GDC were formally adopted, evaluated on a plant-specific basis determined to be safe, and licensed by the Commission.

The licensee has made changes to the facility over the life of the plant that may have invoked the final GDC. The extent to which the final GDC have been invoked can be found in specific sections of the UFSAR and in other plant-specific design and licensing basis documentation.

The NRC staff identified that final GDC-10, "Reactor design," is applicable to this LAR. Final GDC-10 requires that the reactor core and associated coolant, control, and protection systems be designed with appropriate margin to assure that specified acceptable fuel design limits (SAFDLs) are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences (AOOs).

Technical Specification Requirements

In 10 CFR 50.36, "Technical specifications," the NRC established its regulatory requirements related to the content of TSs. Pursuant to 10 CFR 50.36, TSs are required to include items in the following five specific categories: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation; (3) surveillance requirements; (4) design features; and (5) administrative controls. The regulation does not specify the particular requirements to be included in a plant's TSs.

As discussed in 10 CFR 50.36(c)(1), safety limits for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity. If a safety limit is exceeded, the reactor must be shut down. TS 2.1 specifies the reactor core safety limits for OCNCS and TS 2.1.1 specifies the reactor core safety limits for NMP1.

As discussed in Section 4.1 of Attachment 1 of the licensee's application (Reference 1), the fuel cladding is one of the physical barriers that separates the radioactive materials from the environment. The integrity of this cladding barrier is related to its relative freedom from perforations or cracking. Fuel cladding perforations can result from thermal stresses, which can occur from reactor operation significantly above design conditions. Since the parameters that result in fuel damage are not directly observable during reactor operation, the thermal and hydraulic conditions that result in the onset of transition boiling (OTB) have been used to mark the beginning of the region in which fuel cladding damage could occur. The reactor core safety limits are set such that fuel cladding integrity is maintained and no significant fuel damage is calculated to occur due to OTB if the safety limits are not exceeded.

Guidance Documents

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition" (hereinafter referred to as "SRP"), provides guidance on, among other things, the acceptability of the reactivity control systems, the reactor core, and fuel system design. Relevant sections of the SRP used in review of this LAR include the following:

- Chapter 4, Section 4.2, "Fuel System Design," Revision 3, dated March 2007 (ADAMS Accession No. ML070740002). Section 4.2 specifies the criteria for evaluation of fuel damage and whether fuel designs meet the SAFDLs.
- Chapter 4, Section 4.4, "Thermal and Hydraulic Design," Revision 2, dated March 2007 (ADAMS Accession No. ML070550060). Section 4.4 provides guidance on the review of thermal-hydraulic design in meeting the requirements of GDC-10 and the fuel design criteria established in SRP Section 4.2. It states that the critical power ratio (CPR) is to be established such that at least 99.9 percent of fuel rods in the core would not be expected to experience a departure from nucleate boiling or OTB during normal operation or AOOs.

3.0 TECHNICAL EVALUATION

Each fuel vendor has developed critical power correlations valid over specified pressure and flow ranges (mass flow rates) that are approved by the NRC. These critical power correlations have become increasingly fuel design dependent as advanced fuel designs have evolved. The critical power correlations for some advanced fuel designs have received NRC approval down to a lower pressure than those approved previously. If justified, the lower-bound of the extended pressure ranges for these advanced fuel designs can be used to establish a lower reactor steam dome pressure than specified in the TSs for previous fuel designs. As such, a wider pressure range would be available for a PRFO transient to demonstrate compliance with MCPR limits. As discussed above in SE Sections 2.1 and 2.2, the licensee proposes to reduce the reactor steam dome pressure specified in TS 2.1.A and TS 2.1.B for OCNGS and TS 2.1.1.a and TS 2.1.1.b for NMP1 from 785 psig (~800 psia) to 700 psia based on the lower-bound pressure for the critical power correlation for the GNF2 fuel currently used in the OCNGS and NMP1 cores.

The OTB in BWR fuel assemblies, during both steady-state and reactor transient conditions, can be predicted by the GE critical quality – boiling length correlation, better known as the GEXL correlation. The critical power correlation (i.e., GEXL correlation) for GNF2 fuel (referred to as the GEXL17 correlation) is documented in GNF report NEDC-33292P, "GEXL17 Correlation for GNF2 Fuel," Revision 3, dated June 2009 (Reference 5). As discussed in this report, in the core design process, the GEXL17 correlation is used to determine the expected thermal margin for the operating cycle. In the safety analysis process, the GEXL17 correlation is used in the determination of the change in the CPR during postulated transients and in the determination of an acceptable MCPR safety limit.

GNF Licensing Topical Report (LTR) NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel" (Reference 6), provides generic information relative to the fuel design and analyses of BWRs that use the GE and GNF fuel designs. This LTR (referred to as GESTAR II)

consists of a description of the fuel licensing criteria and fuel thermal-mechanical, nuclear, and thermal-hydraulic analyses bases. In accordance with OCNGS TS 6.9.1.f, "Core Operating Limits Report (COLR)," and NMP1 TS 6.6.5, "Core Operating Limits Report (COLR)," the analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, as described in the latest approved version of GESTAR II.

In a letter dated March 5, 2010 (Reference 7), GNF submitted proposed Amendment No. 33 to GESTAR II for NRC review and approval. The letter also provided GNF Report NEDC-33270P, "GNF2 Advantage Generic Compliance with NEDE-24011-P-A (GESTAR II)," Revision 3, dated March 2010. The GNF report documented the completion of the requirements for the new GNF2 fuel design per the criteria in GESTAR II. In a letter dated August 30, 2010 (Reference 8), the NRC staff approved Amendment No. 33 to GESTAR II. Amendment No. 33 was incorporated in Revision 17 to GESTAR II by GNF letter dated September 22, 2010 (Reference 9).

Section 3.8.3 of GNF report NEDC-33270P discusses the critical power correlation for GNF2 fuel (i.e., the GEXL17 correlation). This section includes the pressure range over which the GEXL17 correlation is valid for GNF2 fuel, consistent with the information provided in Table 5-4 of GNF2 report NEDC-33292P. As discussed in Section 3.0 of Attachment 1 of the licensee's application (Reference 1), the lower bound pressure limit for the GEXL17 correlation is 700 psia. The proposed reactor steam dome pressure, in TS 2.1 for OCNGS and TS 2.1.1 for NMP1, of 700 psia is based on the lower bound pressure for the GEXL17 correlation. In addition, the licensee's application stated that an assessment was performed that determined that reactor steam dome pressure would not fall below 700 psia while above 25 percent RTP during a PRFO transient.

Based on the above, the NRC staff finds that:

- 1) The use of the GEXL17 correlation for GNF2 fuel is considered an NRC-approved method, consistent with the latest approved version of GESTAR II.
- 2) The use of GESTAR II for development of the OCNGS and NMP1 core operating limits is consistent with the provisions in TS 6.9.1.f and TS 6.6.5, respectively.
- 3) The use of the GEXL17 correlation will ensure that valid CPR calculations are performed for the AOOs applicable to OCNGS or NMP1, including the PRFO transient.
- 4) The proposed 700 psia reactor steam dome pressure in TS 2.1.A and TS 2.1.B for OCNGS and TS 2.1.1.a and TS 2.1.1.b for NMP1 are justified based on the lower bound pressure associated with the GEXL17 correlation for GNF2 fuel.
- 5) Since the licensee's assessment determined that reactor steam dome pressure would not fall below 700 psia while above 25 percent RTP during a PRFO transient, revising the reactor steam dome pressure in TS 2.1.A and TS 2.1.B for OCNGS and TS 2.1.1.a and TS 2.1.1.b for NMP1 from 785 psig (~800 psia) to 700 psia resolves the 10 CFR Part 21 issue discussed above in SE Section 2.1.

Based on the above findings, the NRC staff concludes that as long as the core pressure and flow are within the range of validity of the GEXL17 correlation, the proposed reactor steam dome pressure changes to the reactor core safety limits in TS 2.1.A and TS 2.1.B for OCNGS and TS 2.1.1.a and TS 2.1.1.b for NMP1 provide reasonable assurance that 99.9 percent of the fuel rods in the core are not expected to experience OTB during normal operation or AOOs. As such, this will continue to ensure that SAFDLs are not exceeded during normal operation or AOOs, consistent with the requirements in final GDC-10. Furthermore, the NRC staff concludes that the proposed change establishes reactor core safety limits, reasonably certain to protect the integrity of the fuel cladding barrier and guard against an uncontrolled release of radioactivity, consistent with the requirements in 10 CFR 50.36(c)(1). Based on the above conclusions, the NRC staff further concludes that the proposed amendments are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Jersey State official and the State of New York official was notified of the proposed issuance of the amendments. The State officials had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component 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 as published in the *Federal Register* on September 27, 2016 (81 FR 66307). 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.

7.0 REFERENCES

1. Barstow, J., Exelon Generation Company, LLC, letter to U.S. Nuclear Regulatory Commission, "License Amendment Request – Proposed Revision to Technical specifications in Response to GE Energy – Nuclear 10 CFR Part 21 Safety Communication SC05-03," dated August 1, 2016 (ADAMS Accession No. ML16215A128).
2. GE Energy-Nuclear, letter to the U.S. Nuclear Regulatory Commission, "10 CFR 21 Reportable Condition Notification: Involving Potential to Exceed Low Pressure Technical Specification Safety Limit," dated March 29, 2005 (ADAMS Accession No. ML050950428).
3. Technical Specifications Task Force letter to the U.S. Nuclear Regulatory Commission transmitting TSTF-495, Revision 0, "Bases Change to Address GE Part 21 SC05-03," dated July 18, 2006 (ADAMS Accession No. ML061990227).
4. Kobetz, T. J., U.S. Nuclear Regulatory Commission, letter to Technical Specification Task Force, "Denial of TSTF-495, Revision 0, 'Bases Change to Address GE Part 21 SC05-03'," dated August 27, 2007 (ADAMS Accession No. ML072340113).
5. Global Nuclear Fuel report NEDC-33292P, "GEXL17 Correlation for GNF2 Fuel," Revision 3, dated June 2009 (ADAMS Accession No. ML091830641) (proprietary information; not publicly available).¹
6. Moore, B. R., GE-Hitachi Nuclear Energy Americas LLC, letter to U.S. Nuclear Regulatory Commission, "Accepted Proprietary and Non-Proprietary Versions of Revision 23 to NEDE-24011-P, 'General Electric Standard Application for Reactor Fuel' (Gestar II), Main and United States Supplement (ADAMS Package Accession No. ML16250A043) (latest approved revision).
7. Lingenfelter, A. A., Global Nuclear Fuel-Americas, LLC, letter MFN 10-045 to the U.S. Nuclear Regulatory Commission, "Amendment 33 to NEDE-24011-P, General Electric Standard Application for Reactor Fuel (GESTAR II) and GNF2 Advantage Generic Compliance with NEDE-24011-P-A (GESTAR II), NEDC-33270P, Revision 3, March 2010," dated March 5, 2010 (ADAMS Package Accession No. ML100700464).
8. Blount, T. B., U.S. Nuclear Regulatory Commission, letter to Mr. Andrew A. Lingenfelter, Global Nuclear Fuel – Americas, LLC, "Final Safety Evaluation for Amendment 33 to Global Nuclear Fuel Topical Report NEDE-24011-P, 'General Electric Standard Application for Reactor Fuel (GESTAR II)' (TAC No. ME3525)," dated August 30, 2010 (ADAMS Accession No. ML102280144).

¹ This proprietary report was submitted to the NRC as Enclosure 4 to GNF letter MFN 09-436 dated June 30, 2009 (ADAMS Accession No. ML091830614). Enclosure 5 to the letter (ADAMS Accession No. ML091830624) is a publicly available version of the report.

9. Lingenfelter, A. A., Global Nuclear Fuel- Americas, LLC, letter MFN 10-250 to the U.S. Nuclear Regulatory Commission, "Accepted Proprietary and Non-Proprietary Versions of Revision 17 to NEDE-24011-P, 'General Electric Standard Application for Reactor Fuel (GESTAR II), Main and United States Supplement," dated September 22, 2010 (ADAMS Package Accession No. ML102660094).

Principal Contributor: J. Lamb

Date: November 29, 2016

B. Hanson

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A copy of the related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

John G. Lamb, Senior Project Manager
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-219 and 50-220

Enclosures:

1. Amendment No. 289 to DPR-16
2. Amendment No. 225 to DPR-63
3. Safety Evaluation

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