



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

April 27, 2016

Mr. Bryan C. Hanson
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 - ISSUANCE
OF AMENDMENTS RE: REDUCE STEAM DOME PRESSURE SPECIFIED IN
REACTOR CORE SAFETY LIMITS (CAC NOS. MF7184 AND MF7185)

Dear Mr. Hanson:

The Commission has issued the enclosed Amendments Nos. 306 and 310 to Renewed Facility Operating License Nos. DPR-44 and DPR-56 for the Peach Bottom Atomic Power Station, Units 2 and 3. These amendments consist of changes to the technical specifications (TSs) in response to your application dated December 15, 2015, as supplemented by letter dated March 15, 2016.

The amendments reduce the reactor steam dome pressure stated in the TSs for the reactor core safety limits. The change addresses a Title 10 of the *Code of Federal Regulations* Part 21 issue concerning the potential to violate the safety limits during a pressure regulator failure maximum demand (open) transient.

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

Sincerely,

A handwritten signature in black ink, appearing to read "RBE", with a stylized flourish at the end.

Richard B. Ennis, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-277 and 50-278

Enclosures:

1. Amendment No. 306 to Renewed DPR-44
2. Amendment No. 310 to Renewed DPR-56
3. Safety Evaluation

cc w/enclosures: Distribution via Listserv



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

EXELON GENERATION COMPANY, LLC

PSEG NUCLEAR LLC

DOCKET NO. 50-277

PEACH BOTTOM ATOMIC POWER STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 306
Renewed License No. DPR-44

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Exelon Generation Company, LLC (Exelon Generation Company) and PSEG Nuclear LLC (the licensees), dated December 15, 2015, as supplemented by letter dated March 15, 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-44 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 306, 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.

FOR THE NUCLEAR REGULATORY COMMISSION



DB Douglas A. Broaddus, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Date of Issuance: April 27, 2016

ATTACHMENT TO LICENSE AMENDMENT NO. 306
RENEWED FACILITY OPERATING LICENSE NO. DPR-44

DOCKET NO. 50-277

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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Insert
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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
2.0-1

Insert
2.0-1

- (5) Exelon Generation Company, pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not to separate, such byproduct and special nuclear material as may be produced by operation of the facility, and such Class B and Class C low-level radioactive waste as may be produced by the operation of Limerick Generating Station, Units 1 and 2.

C. This renewed 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 of Part 50, and Section 70.32 of Part 70; all applicable provisions of the Act and the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified below:

- (1) Maximum Power Level

Exelon Generation Company is authorized to operate the Peach Bottom Atomic Power Station, Unit 2, at steady state reactor core power levels not in excess of 3951 megawatts thermal.

- (2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 306, are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications.

- (3) Physical Protection

Exelon Generation Company shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822), and the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans¹, submitted by letter dated May 17, 2006, is entitled: "Peach Bottom Atomic Power Station Security Plan, Training and Qualification Plan, Safeguards Contingency Plan, and Independent Spent Fuel Storage Installation Security Program, Revision 3." The set contains Safeguards Information protected under 10 CFR 73.21.

Exelon Generation Company shall fully implement and maintain in effect all provisions of the Commission-approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The Exelon Generation Company CSP was approved by License Amendment No. 281 and modified by Amendment No. 301.

- (4) Fire Protection

The 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 NRC Safety Evaluation Report (SER) dated May 23, 1979, and Supplements dated August 14, September 15, October 10 and November 24, 1980, and in the NRC SERs dated September 16, 1993, and August 24, 1994, subject to the following provision:

¹ The Training and Qualification Plan and Safeguards Contingency Plan are Appendices to the Security Plan.

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 700 psia or core flow < 10% rated core flow:

THERMAL POWER shall be \leq 23% RTP.

2.1.1.2 With the reactor steam dome pressure \geq 700 psia and core flow \geq 10% rated core flow:

MCPR shall be \geq 1.15 for two recirculation loop operation or \geq 1.15 for single recirculation loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be \leq 1325 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.

(continued)



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

EXELON GENERATION COMPANY, LLC

PSEG NUCLEAR LLC

DOCKET NO. 50-278

PEACH BOTTOM ATOMIC POWER STATION, UNIT 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 310
Renewed License No. DPR-56

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Exelon Generation Company, LLC (Exelon Generation Company) and PSEG Nuclear LLC (the licensees), dated December 15, 2015, as supplemented by letter dated March 15, 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.

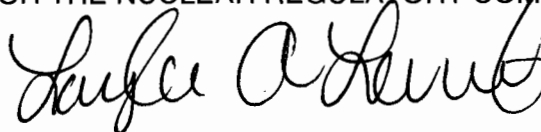
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Renewed Facility Operating License No. DPR-56 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 310, 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.

FOR THE NUCLEAR REGULATORY COMMISSION



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Douglas A. Broaddus, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Date of Issuance: April 27, 2016

ATTACHMENT TO LICENSE AMENDMENT NO. 310
RENEWED FACILITY OPERATING LICENSE NO. DPR-56

DOCKET NO. 50-278

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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Insert
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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
2.0-1

Insert
2.0-1

- (5) Exelon Generation Company, pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not to separate, such byproduct and special nuclear material as may be produced by operation of the facility, and such Class B and Class C low-level radioactive waste as may be produced by the operation of Limerick Generating Station, Units 1 and 2.

C. This renewed 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 of Part 50, and Section 70.32 of Part 70; all applicable provisions of the Act and the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified below:

(1) Maximum Power Level

Exelon Generation Company is authorized to operate the Peach Bottom Atomic Power Station, Unit No. 3, at steady state reactor core power levels not in excess of 3951 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 310, are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications.

(3) Physical Protection

Exelon Generation Company shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822), and the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans¹, submitted by letter dated May 17, 2006, is entitled: "Peach Bottom Atomic Power Station Security Plan, Training and Qualification Plan, Safeguards Contingency Plan, and Independent Spent Fuel Storage Installation Security Program, Revision 3." The set contains Safeguards Information protected under 10 CFR 73.21.

Exelon Generation Company shall fully implement and maintain in effect all provisions of the Commission-approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The Exelon Generation Company CSP was approved by License Amendment No. 283 and modified by Amendment No. 304.

¹The Training and Qualification Plan and Safeguards Contingency Plan and Appendices to the Security Plan.

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 700 psia or core flow < 10% rated core flow:

THERMAL POWER shall be \leq 23% RTP.

2.1.1.2 With the reactor steam dome pressure \geq 700 psia and core flow \geq 10% rated core flow:

MCPR shall be \geq 1.15 for two recirculation loop operation or \geq 1.15 for single recirculation loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be \leq 1325 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.

(continued)



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 306 TO
RENEWED FACILITY OPERATING LICENSE NO. DPR-44 AND
AMENDMENT NO. 310 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-56
EXELON GENERATION COMPANY, LLC
PSEG NUCLEAR LLC
PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3
DOCKET NOS. 50-277 AND 50-278

1.0 INTRODUCTION

By application dated December 15, 2015 (Reference 1), as supplemented by letter dated March 15, 2016 (Reference 10), Exelon Generation Company, LLC (Exelon, the licensee) submitted a license amendment request (LAR) for the Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3.

The proposed amendments would reduce the reactor steam dome pressure stated in Technical Specification (TS) 2.1.1 for the reactor core safety limits. The proposed change addresses a Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21 issue concerning the potential to violate the safety limits during a pressure regulator failure maximum demand (open) (PRFO) transient.

The supplement dated March 15, 2016, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC or the Commission) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on January 5, 2016 (81 FR 263).

2.0 REGULATORY EVALUATION

2.1 Background

PBAPS, Units 2 and 3, TS 2.1.1.1 currently requires that when steam dome pressure is less than 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 23 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 NRC. The 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 2.1.1.1. As such, this condition would result in a violation of the reactor core safety limit in TS 2.1.1.1. The notification indicated that a number of boiling-water reactor (BWR) plants, including PBAPS, Units 2 and 3, were affected. Initially, the Boiling Water Reactor Owners Group (BWROG) attempted to resolve the 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 TS Bases and would be able to 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 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 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 PBAPS, Units 2 and 3, 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 PBAPS, Units 2 and 3 cores.

2.2 Proposed TS Changes

Consistent with the approach discussed above in this SE, Section 2.1, the licensee proposes to reduce the reactor steam dome pressure specified in TS 2.1.1.1 and TS 2.1.1.2 from 785 psig to 700 pounds per square inch atmospheric (psia)¹. The revised TSs would read as follows:

- 2.1.1.1 With the reactor steam dome pressure < 700 psia or core flow < 10% rated core flow:

THERMAL POWER shall be \leq 23% RTP.

- 2.1.1.2 With the reactor steam dome pressure \geq 700 psia and core flow \geq 10% rated core flow:

MCPR shall be \geq 1.15 for two recirculation loop operation or \geq 1.15 for single recirculation loop operation.

Note that the minimum critical power ratio (MCPR) values shown above in proposed TS 2.1.1.2 are not affected by this LAR. However, PBAPS, Units 2 and 3, Amendment Nos. 304 and 308, respectively, dated February 8, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML15343A165 and ML15343A177, respectively), changed the MCPR value for two recirculation loop operation from 1.10 to 1.15 and the MCPR value for single recirculation loop operation from 1.14 to 1.15. Those amendments will be implemented prior to operation in the Maximum Extended Load Line Limit Analysis Plus (MELLLA+) operating domain to support the associated MELLLA+ amendment (Amendment Nos. 305 and 309 dated March 21, 2016 (ADAMS Accession No. ML16034A372)).

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 PBAPS, Units 2 and 3, was issued by the Atomic Energy Commission (AEC) on January 31, 1968. As discussed in Appendix H to the PBAPS Updated Final Safety Analysis Report (UFSAR), during the construction/licensing process, both units were evaluated against the then-current AEC draft of the 27 General Design Criteria (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"). Appendix H of the PBAPS UFSAR contains an evaluation of the design basis of PBAPS, Units 2 and 3, against the draft GDC. The licensee concluded that PBAPS, Units 2 and 3, conform to the intent of the draft GDC.

¹ The application dated December 15, 2015, initially proposed that the steam dome pressure be changed to 685 psig. In response to a request for additional information from the NRC staff, the licensee, in its supplement dated March 15, 2016, proposed that the steam dome pressure be changed to 700 psia (i.e., approximately 685.3 psig).

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, dated September 18, 1992 (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 was 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 2.1.1 specifies the reactor core safety limits for PBAPS, Units 2 and 3.

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 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 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 2.1.1.1 and TS 2.1.1.2 from 785 psig to 700 psia based on the lower-bound pressure for the critical power correlation for the GNF2 fuel currently used in the PBAPS, Units 2 and 3, 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 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 PBAPS, Units 2 and 3, TS 5.6.5, "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 2.1.1.1 and TS 2.1.1.2 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 23 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 PBAPS, Units 2 and 3, core operating limits is consistent with the provisions in TS 5.6.5.
- 3) The use of the GEXL17 correlation will ensure that valid CPR calculations are performed for the AOOs applicable to PBAPS, Units 2 and 3, including the PRFO transient.
- 4) The proposed 700 psia reactor steam dome pressure in TS 2.1.1.1 and TS 2.1.1.2 is 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 23 percent RTP during a PRFO transient, revising the reactor steam dome pressure in TS 2.1.1.1 and TS 2.1.1.2 from 785 psig 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 2.1.1.1 and TS 2.1.1.2 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.

The NRC staff notes that if PBAPS, Units 2 and 3, transition to a new fuel design, the licensee should review the critical power correlation to determine if further changes to the reactor core safety limits are required. As long as the lower bound pressure associated with the correlation for the new fuel design is less than or equal to the TS 2.1.1.1 and TS 2.1.1.2 reactor steam dome pressure, then an LAR would not be required. However, if the lower bound pressure associated with the critical power correlation for the new fuel design is higher than the reactor steam dome pressure specified in TS 2.1.1.1 and TS 2.1.1.2, an LAR would be required.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendments. The State official 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 (81 FR 263). 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. Exelon letter to the NRC, "License Amendment Request to Reduce Steam Dome Pressure Specified in the Reactor Core Safety Limits," dated December 15, 2015 (ADAMS Accession No. ML15349A800).

2. GE letter to the NRC, "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 NRC transmitting TSTF-495, Revision 0, "Bases Change to Address GE Part 21 SC05-03," dated July 18, 2006 (ADAMS Accession No. ML061990227).
4. NRC 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. GNF report NEDC-33292P, "GEXL17 Correlation for GNF2 Fuel," Revision 3, dated June 2009 (ADAMS Accession No. ML091830641 (non-publicly available)).²
6. GNF LTR NEDE 24011P-A, "General Electric Standard Application for Reactor Fuel" (latest approved revision).
7. GNF letter MFN 10-045 to the NRC, "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. NRC letter to GNF, "Final Safety Evaluation for Amendment 33 to Global Nuclear Fuel Topical Report NEDE-24011-P, General Electric Standard Application for Reactor Fuel (GESTAR II)," dated August 30, 2010 (ADAMS Accession No. ML102280144).
9. GNF letter MFN 10-250 to the NRC, "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).
10. Exelon letter to the NRC, "Response to Request for Additional information Regarding License Amendment Request to Reduce Steam Dome Pressure Specified in the Reactor Core Safety Limits," dated March 15, 2016 (ADAMS Accession No. ML16077A233).

Principal Contributor: R. Ennis

Date: April 27, 2016

² 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.

April 27, 2016

Mr. Bryan C. Hanson
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 - ISSUANCE OF AMENDMENTS RE: REDUCE STEAM DOME PRESSURE SPECIFIED IN REACTOR CORE SAFETY LIMITS (CAC NOS. MF7184 AND MF7185)

Dear Mr. Hanson:

The Commission has issued the enclosed Amendments Nos. 306 and 310 to Renewed Facility Operating License Nos. DPR-44 and DPR-56 for the Peach Bottom Atomic Power Station, Units 2 and 3. These amendments consist of changes to the technical specifications (TSs) in response to your application dated December 15, 2015, as supplemented by letter dated March 15, 2016.

The amendments reduce the reactor steam dome pressure stated in the TSs for the reactor core safety limits. The change addresses a Title 10 of the *Code of Federal Regulations* Part 21 issue concerning the potential to violate the safety limits during a pressure regulator failure maximum demand (open) transient.

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

Sincerely,

/RA/

Richard B. Ennis, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-277 and 50-278

Enclosures:

1. Amendment No. 306 to Renewed DPR-44
2. Amendment No. 310 to Renewed DPR-56
3. Safety Evaluation

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ADAMS Accession No.: ML16064A150

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DATE	3/23/16	3/23/16	3/25/16	3/30/16	4/5/16
OFFICE	DORL/LPL1-2/BC	DORL/LPL1-2/PM			
NAME	DBroaddus (TLamb for)	REnnis			
DATE	4/27/16	4/27/16			

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