



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

December 18, 2012

Mr. Michael J. Pacilio
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3,
SUPPLEMENTAL INFORMATION NEEDED FOR ACCEPTANCE OF
REQUESTED LICENSING ACTION RE: EXTENDED POWER UPRATE
(TAC NOS. ME9631 AND ME9632)

Dear Mr. Pacilio:

By letter dated September 28, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML122860201), Exelon Generation Company, LLC (Exelon, the licensee) submitted a license amendment request for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The proposed amendment would authorize an increase in the maximum power level from 3514 megawatts thermal (MWt) to 3951 MWt. The requested change, referred to as an extended power uprate (EPU), represents an increase of approximately 12.4 percent above the current licensed thermal power level.

The purpose of this letter is to provide the results of the U.S. Nuclear Regulatory Commission (NRC) staff's acceptance review of this amendment request. The acceptance review was performed to determine if there is sufficient technical information, in scope and depth, to allow the NRC staff to complete its detailed technical review. The acceptance review is also intended to identify whether the application has any readily apparent information insufficiencies in its characterization of the regulatory requirements or the licensing basis of the plant.

Consistent with Section 50.90 of Title 10 of the *Code of Federal Regulations* (10 CFR), an amendment to the license (including the technical specifications) must fully describe the changes requested, and following as far as applicable, the form prescribed for original applications. Section 50.34 of 10 CFR addresses the content of technical information required. This section stipulates that the submittal address the design and operating characteristics, unusual or novel design features, and principal safety considerations.

The NRC staff has reviewed your application and concluded that the information delineated in the enclosure to this letter is necessary to enable the staff to make an independent assessment regarding the acceptability of the proposed amendment request in terms of regulatory requirements and the protection of public health and safety and the environment.

*Enclosure 1 transmitted herewith contains sensitive unclassified information.
When separated from Enclosure 1, this document is decontrolled.*

In order to make the application complete, the NRC staff requests that Exelon supplement the application to address the information requested in Enclosure 1 by February 15, 2013. This will enable the NRC staff to begin its detailed technical review. If the information responsive to the NRC staff's request is not received by the above date, the application will not be accepted for review pursuant to 10 CFR 2.101, and the NRC will cease its review activities associated with the application. If the application is subsequently accepted for review, you will be advised of any further information needed to support the staff's detailed technical review by separate correspondence.

The information requested was discussed in conference calls with your staff on November 20, November 26, December 3, December 6, and December 17, 2012. The response timeframe was discussed with Mr. Kevin Borton and Mr. Ken Ainger of your staff on December 17, 2012.

The NRC staff has determined that Enclosure 1 contains proprietary information pursuant to 10 CFR 2.390. Accordingly, the staff has prepared a redacted, publicly available, non-proprietary version (i.e., Enclosure 2).

If you have any questions, please contact me at (301) 415-1420.

Sincerely,



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. Supplemental Information Needed (non-publicly available)
2. Supplemental Information Needed (publicly available)

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SUPPLEMENTAL INFORMATION NEEDED
PERTAINING TO AMENDMENT REQUEST FOR AN EXTENDED POWER UPRATE
EXELON GENERATION COMPANY, LLC
PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3
DOCKET NOS. 50-277 AND 50-278

Proprietary information pursuant to
Title 10 of the *Code of Federal Regulations* (10 CFR) Section 2.390
has been redacted from this document.
Redacted information is identified by blank space enclosed within double brackets
as shown here [[]].

Enclosure 2

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SUPPLEMENTAL INFORMATION NEEDED

PERTAINING TO AMENDMENT REQUEST FOR AN EXTENDED POWER UPRATE

EXELON GENERATION COMPANY, LLC

PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-277 AND 50-278

Background

By letter dated September 28, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML122860201), Exelon Generation Company, LLC (Exelon, the licensee) submitted a license amendment request for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The proposed amendment would authorize an increase in the maximum power level from 3514 megawatts thermal (MWt) to 3951 MWt. The requested change, referred to as an extended power uprate (EPU), represents an increase of approximately 12.4 percent above the current licensed thermal power level.

The NRC staff has reviewed your application and concluded that the information discussed for each of the issues, below, is necessary to enable the staff to make an independent assessment regarding the acceptability of the proposed amendment request, in terms of regulatory requirements and the protection of public health and safety and the environment.

Issue 1 - Safety Evaluation Template

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, conforms 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 Title 10 of the *Code of Federal Regulations* (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 included 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 licensees for PBAPS, Units 2 and 3, have 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's review schedule for an EPU request is based on using the guidance contained in RS-001, "Review Standard for Extended Power Uprates" (ADAMS Accession No. ML033640024). The staff intends to use the safety evaluation (SE) template contained in Section 3.2 of RS-001 (i.e., template for boiling-water reactors) to generate the plant-specific SE for the PBAPS EPU review.

The SE template in RS-001 is based on a plant designed to the final GDC. As such, considerable effort would need to be expended by the NRC staff to modify the template, such that it reflects the design basis for PBAPS. As discussed in Section 2.1 of RS-001, licensees are encouraged to provide, with their EPU applications, markups of the SE template to identify any differences between the review standard and the design bases of their plants. The review standard states "[t]his should avoid potential delays and improve the efficiency of the staff's review."

Based on the above, the licensee is requested to provide a supplement to the EPU application that includes the following:

- a) A redline/strikeout version of the SE template, as shown in Section 3.2 of RS-001, which modifies each of the "Regulatory Evaluation" and "Conclusion" paragraphs in the technical evaluation portion of the SE (i.e., SE Section 2.0, "Evaluation"), consistent with the PBAPS, Units 2 and 3, design basis.
- b) A clean version of the SE template, incorporating all the redline/strikeout changes. The clean version should be provided in hard copy as well as electronic format (Microsoft Word).

Issue 2 - Steam Dryer Analysis

In accordance with the second and fifth criteria ("Sufficiency of Information" and "Use of Precedent") in Section 3.1.2 of Appendix B to Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-109, Revision 1, "Acceptance Review Procedures" (ADAMS Accession No. ML091810088), the NRC staff in NRR's Mechanical and Civil Engineering Branch (EMCB) has determined that the PBAPS EPU license amendment request (LAR) is unacceptable for review, pending submittal of supplemental information pertaining to the steam dryer analysis. The NRC staff has reached this conclusion based on the following: (1) the issues identified below represent significant, obvious deficiencies with the information and analyses provided to support the LAR and would generate an inordinate amount of requests for additional information (RAIs); (2) the precedent licensing actions, cited throughout the documents enclosed in Attachment 17 to the LAR submittal, including the [[

]] are not directly applicable to the

PBAPS EPU steam dryer evaluations. As such, the licensee must provide sufficient and adequate justification for citing information and analyses related to these precedents. These issues are discussed in detail, below, and are primarily related to NRC staff experience with previous EPU LARs.

[[

]]

As discussed in the LAR, the licensee evaluated the existing PBAPS original equipment manufacturer's steam dryers and determined the steam dryers would not be suitable for EPU conditions without modifications. As such, the licensee has decided to replace the original steam dryers with Westinghouse designed and manufactured Nordic steam dryers. For the PBAPS replacement steam dryers (RSDs), [[

]] The effect of these design differences [[

]] needs to be addressed.

The specific supplemental information needed is delineated below.

EMCB Supplemental Information Request 1

As discussed in Section 4.2 of Attachment 1 to the LAR, the RSDs for PBAPS will use the Acoustic Circuit Model (ACM) Revision 4.1 methodology for the steam dryer analysis. Tables 3-2, 3-3, and 3-4 of Attachment 17, Enclosure 17B.1 (WCAP-17590-P, "Peach Bottom Units 2 & 3 Replacement Steam Dryer Acoustic Load Definition," Revision 0), to the LAR show [[

]]

Based on the information submitted in the application, the NRC staff finds the use of [[
]] unacceptable.

Since the use of Nordic design-type steam dryer in U.S. boiling water reactors is relatively new, and the experience in estimating the pressure loads acting on it is very limited, the licensee

should establish [[

]] The licensee should either provide these [[
]] or provide further, technically sound justification for using [[

]]

EMCB Supplemental Information Request 2

Table 3-3 of Attachment 17, Enclosure 17B.1 (WCAP-17590-P), to the LAR shows [[

]] The licensee should address design and modeling considerations to justify the proposed approach.

EMCB Supplemental Information Request 3

Tables 5-3, 5-4 and 5-6 of Attachment 17, Enclosure 17B.6 (WCAP-17626-P, "Processing of Peach Bottom Unit 2 and Unit 3 MSL Strain Gauge Data and Computation of Predicted EPU Signature," Revision 0), to the LAR indicate that [[

]] The NRC staff finds this unacceptable and notes that the [[

]] Therefore, the NRC staff requests the licensee to consider the [[]] in the steam dryer evaluation and provide the revised assessment of the dryer which considers these effects.

Issue 3 - Emergency Core Cooling System Analysis

The "Executive Summary" in Attachment 4 to the application dated September 28, 2012, discusses the approach used for the PBAPS EPU. The summary states, in part, that:

GE-Hitachi Nuclear Energy Americas LLC (GEH) has previously developed and implemented Extended Power Uprate (EPU) at several nuclear power plants. Based on EPU experience, GEH developed an approach to uprate reactor power that maintains the current plant maximum normal operating reactor dome pressure. This approach is referred to as Constant Pressure Power Uprate (CPPU) and was approved by the Nuclear Regulatory Commission (NRC) in the Licensing Topical Report (LTR) NEDC-33004P-A, Revision 4, "Constant Pressure Power Uprate," hereafter referred to as the CLTR. The CLTR was approved for Boiling Water Reactor (BWR) plants containing General Electric (GE) fuel types through GE14 and using GEH accident analysis methods. PBAPS contains only GE fuel types, through and including GNF2, and this evaluation uses only GEH accident analysis methods.

Because PBAPS uses GNF2 fuel, the CLTR is not applicable for fuel design dependent evaluations and the transients performed in support of the generic

disposition in the CLTR are not applicable. Therefore, for fuel-dependent topics, this report follows the NRC-approved generic content for BWR EPU licensing reports, documented in NEDC-32424P-A, "Generic Guidelines For General Electric Boiling Water Reactor Extended Power Uprate," commonly called "ELTR1." Per ELTR1, every safety issue that should be addressed in a plant-specific EPU licensing report is addressed in this report. For issues that have been evaluated generically, this report references the NRC-approved generic evaluations in NEDC-32523P-A, "Generic Evaluations of General Electric Boiling Water Reactor Extended Power Uprate," which is commonly called "ELTR2."

Section 2.8.5.6.2.5 of Attachment 6 to the application dated September 28, 2012, provides a discussion regarding the Emergency Core Cooling System (ECCS) performance at EPU conditions. The first paragraph of this section states that because the PBAPS EPU is based on GNF2 fuel, the ECCS analysis was based on ELTR1.

Section 5.3.1 of the ELTR, which discusses ECCS - Loss-of-Coolant Accident (LOCA) performance analyses, states, in part, that:

ECCS-LOCA performance analyses will be performed to demonstrate that the 10 CFR 50.46 requirements continue to be met consistent with the uprate conditions (power and pressure).....A separate LOCA analysis report may be prepared and submitted before or with the uprate application.

In addition, as discussed in the February 8, 1996, letter from the NRC (Dennis M. Crutchfield) to General Electric (G.L. Sozzi), that approved ELTR1, "[t]he staff expects utilities to provide adequate analytical information to support each plant-specific extended power uprate request."

Although Table 2.8-6 of Attachment 6 to the application provides a summary of the ECCS performance results for EPU, the text in Section 2.8.5.6.2.5 does not provide adequate detail to enable the NRC staff to make an independent assessment. As such, the licensee is requested to provide the ECCS analyses that were performed to support the EPU. This information should include the specific analyses related to the impact on peak cladding temperature, and any single failure evaluations performed for the automatic depressurization system.

In order to make the application complete, the NRC staff requests that Exelon supplement the application to address the information requested in Enclosure 1 by February 15, 2013. This will enable the NRC staff to begin its detailed technical review. If the information responsive to the NRC staff's request is not received by the above date, the application will not be accepted for review pursuant to 10 CFR 2.101, and the NRC will cease its review activities associated with the application. If the application is subsequently accepted for review, you will be advised of any further information needed to support the staff's detailed technical review by separate correspondence.

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

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ADAMS Accession NOS.: PKG ML12320A051

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