

From: Ennis, Rick
Sent: Monday, June 26, 2017 1:36 PM
To: David Neff
Cc: David Helker; Richard.Gropp@exeloncorp.com
Subject: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 -
REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE
AMENDMENT REQUEST FOR MEASUREMENT UNCERTAINTY
RECAPTURE POWER UPRATE (TAC NOS. MF9289 AND MF9290)
Attachments: final01 rai mf9289-90.doc

By application dated February 17, 2017, as supplemented by letter dated March 20, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML17048A444 and ML17080A067, respectively), Exelon Generation Company, LLC (Exelon, the licensee) submitted a license amendment request for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The amendments would revise the Renewed Facility Operating Licenses and Technical Specifications (TSs) to implement a measurement uncertainty recapture (MUR) power uprate. Specifically, the amendments would authorize an increase in the maximum licensed thermal power level from 3,951 megawatts thermal (MWt) to 4,016 MWt which is an increase of approximately 1.66%.

The Nuclear Regulatory Commission's (NRC) staff is reviewing your submittal and has determined that additional information is needed to complete its review. The specific request for additional information (RAI) questions are attached. The RAI questions were provided in draft form to Mr. David Neff of the Exelon staff via e-mail on June 12, 2017. The draft questions were sent to ensure that the questions were understandable, the regulatory basis for the questions was clear, and to determine if the information was previously docketed.

Conference calls between the NRC staff and the Exelon staff were held on June 22 and June 26, 2017, to discuss the draft RAI questions. Based on these calls, the wording for RAI-EEOB-5 was modified to clarify the information needed. Mr. Neff stated that Exelon would provide a response to the RAI questions by July 26, 2017.

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

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

REQUEST FOR ADDITIONAL INFORMATION
REGARDING PROPOSED LICENSE AMENDMENT
MEASUREMENT UNCERTAINTY RECAPTURE POWER UPRATE
EXELON GENERATION COMPANY, LLC
PEACH BOTTOM ATOMIC POWER STATION - UNITS 2 AND 3
DOCKET NOS. 50-277 AND 50-278

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PRA Operations and Human Factors Branch (APHB)

Reviewer: John Hughey

APHB-RAI-1

Attachment 4 to the licensee's application dated February 17, 2017, provides a cross-reference to the topic areas discussed in Attachment 1 to NRC Regulatory Issue Summary (RIS) 2002-003, "Guidance on the Content of Measurement Uncertainty Recapture Power Uprate Applications," (ADAMS Accession No. ML013530183). Items VII.1 through VII.4 in Attachment 1 to RIS 2002-003 pertain to the operator training and human factors review.

Attachment 5 to the licensee's application, GE - Hitachi Nuclear Energy (GEH), "Safety Analysis Report for Peach Bottom Atomic Power Station, Units 2, and 3, Thermal Power Optimization," NEDC-33873P, Revision 0, dated February 2017, summarizes the evaluations performed for PBAPS for the proposed MUR. This proprietary report is referred to as the TSAR (i.e., Thermal

Power Optimization Safety Analysis Report). A public version of the TSAR, GEH report NEDO-33873, is contained in Attachment 7 to Exelon's application.

The cross-reference in Attachment 4 to the licensee's application lists Section 10.9 of the TSAR as responsive to the issues addressed by Item VII.2A in Attachment 1 to RIS 2002-003 regarding emergency and abnormal operating procedures (AOPs). However, no specific information regarding AOPs was provided in Section 10.9 of the TSAR or any other part of the application.

Please provide information related any changes to the PBAPS AOPs or provide a statement confirming that there are no impacts to the AOPs per the guidance in Attachment 1 to RIS 2002-003, Item VII.2A.

APHB-RAI-2

The cross-reference in Attachment 4 to the licensee's application lists Section 10.5 of the TSAR and Section 3.5.6 of Attachment 1 to the application as responsive to the issues addressed for Item VII.2C in Attachment 1 to RIS 2002-003. This item relates to the identification of all modifications, associated with the control room plant reference simulator, to ensure that changes in operator actions do not adversely affect defense in depth or safety margins. However, Section 3.5.6 of Attachment 1 only states that the PBAPS simulator will be modified to reflect any changes to the control room in accordance with established PBAPS certification procedures. No specific modifications associated with the PBAPS simulator are identified, nor is any justification provided assuring that defense in depth or safety margins will not be adversely affected. Section 10.5 of the TSAR does not reference the PBAPS control room simulator at all.

Please identify any modifications associated with the PBAPS simulator and provide the information needed to justify that any changes in operator actions do not adversely affect defense in depth or safety margins per the guidance in RIS 2002-003, Attachment 1, Item VII.2C.

Instrumentation and Controls Branch (EICB)

Reviewer: Rich Stattel

EICB-RAI-1

In the previous MUR power uprate for PBAPS (ADAMS Accession No. ML031000317), a calorimetric core thermal power measurement uncertainty of $\pm 0.38\%$ of rated thermal power (RTP) was used to support a power level increase of 56 MWt (1.62% of RTP). In the current amendment request, a measurement uncertainty of $\pm 0.34\%$ is being used to support the requested power level increase of 65 MWt (1.66% of RTP).

Since the license amendment request states that the previously installed leading edge flow meter (LEFM) instruments are to be credited for the current amendment request and that "[n]o modifications to the LEFM are needed for the thermal power optimization (TPO) implementation," the NRC staff needs to understand the factors that are attributable to this new smaller uncertainty value. Please provide additional information on previous and current

uncertainty factors to establish a basis for the new reduced uncertainties of the installed LEFM instruments. This information is needed to satisfy the criteria of RIS 2002-003, Attachment 1, Item I.1.E, which states that feedwater flow measurement technique and power measurement uncertainty should include a detailed description that includes a calculation of the total power measurement uncertainty at the plant, explicitly identifying all parameters and their individual contribution to the power uncertainty.

EICB-RAI-2

TSAR Section 10.8 states that minor changes are required to restore the TPO requirements to ensure that plant procedures and programs are in place to control the software and hardware configuration of the associated instrumentation.

The NRC staff needs to understand what measures are being taken by the licensee to maintain control over software in instruments that affect the power calorimetric (i.e., LEFM software, Process Plant Computer Software). Please provide a description of the software control measures used for calorimetric instruments at PBAPS including a discussion of the changes being made to restore the TPO requirements as described in the TSAR. This information is needed to satisfy the criteria of RIS 2002-003, Attachment 1, Item I.1.F.ii, "controlling software and hardware configuration."

Balance-of-Plant Branch (SBPB)

Reviewer: Steve Jones

RAI-SBPB-1

The Updated Final Safety Analysis Report (UFSAR) and the application state that cycle-specific discharge plans ensure the fuel pool will be adequately cooled. However, there is an inconsistency between the UFSAR statement about a cycle-specific analysis ensuring the pool will be below 150°F, and the design basis of 140°F for normal refueling (batch or full-core). Also, the design basis temperature for a batch refueling with a single failure is 150°F, but the UFSAR statement does not mention a single failure. We are seeking more detailed information on how the licensee will operationally ensure the cooling capability is adequate to meet all the design bases limits.

Section 10.5.3 of the PBAPS UFSAR, Revision 26 (April 2017), includes the following statement with respect to the timing of refueling discharges from the reactor to the spent fuel pool (SFP):

Since each refueling offload is cycle specific, then the variations in the number of fuel assemblies discharged, the incore decay time, the fuel assembly transfer rate and the power history can vary as long as analysis shows that the spent fuel pool bulk temperature will not exceed 150°F and localized boiling will not be expected to occur.

Similar to the PBAPS UFSAR statement, Section 6.3.1, "Fuel Pool Cooling," of the TSAR (i.e., Attachment 5 to the application) states the following with respect to the timing of refueling discharges:

The SFP cooling and makeup adequacy is maintained by controlling the timing of the discharge (fuel offload) to the SFP to ensure the capability of the FPCCS [fuel pool cooling and cleanup system] to maintain adequate fuel pool cooling for the TPO uprate.

However, Table 10.5.2, "Summary of Cooling System Analysis Results," of the PBAPS UFSAR indicates that the maximum SFP temperature is 140°F for the normal refueling and full-core offload (with residual heat removal system cooling assist) cases with full cooling capability, and 150°F only for the single failure of a fuel pool cooling and cleanup system component. Similarly, Table 6-7 of the TSAR indicates that the maximum SFP temperature for normal refueling and full-core offload is 140°F, except the temperature for the full-core offload at 1.02 times the current licensed thermal power would be 141°F.

The analyses submitted under 10 CFR 50.34 include the final safety analysis report (FSAR) submitted under 50.34(b) as part of the application for an operating license. The FSAR includes information that describes the facility, presents the design bases and the limits on its operation, and presents a safety analysis of the structures, systems, and components and of the facility as a whole. As provided in 10 CFR 50.90, whenever a holder of an operating license desires to amend the license, application for an amendment must be filed with the Commission fully describing the changes desired, and following as far as applicable, the form prescribed for original applications. In determining whether an amendment to a license will be issued to the applicant, 10 CFR 50.92(a) states that the Commission will be guided by the considerations that govern the issuance of initial licenses to the extent applicable and appropriate. Consistent with the requirements indicated above, clarify how the timing of the refueling discharges would be controlled to ensure the design basis temperature limit for normal refueling and full-core offloads of 140°F would not be exceeded.

Electrical Engineering Operating Reactor Branch (EEOB)

Reviewer: Shavon Morris

RAI-EEOB-1

In Section 6.1.1, "Off-Site Power," of the TSAR, the licensee states "[t]he main generator will be operated within the existing generating capability curve at TPO. For summer and winter operations, the gross generator MWe output will be kept on, or within, the existing generator reactive capability curve." Table 6-2, "Main Generator Ratings Comparison," of the TSAR provided the following ratings for the PBAPS main generator: 1,408 megawatts electric (MWe) for Unit 2 and 1,377 MWe for Unit 3 at TPO RTP conditions. In Section 7.1, "Turbine-Generator," of the TSAR, the licensee stated that the main generator was projected to produce an electrical power output of approximately 1,387.9 MWe at TPO RTP.

The NRC staff noted that the projected electrical power output (1,387.9 MWe) for the main generator exceeds the generator rating (1,377 MWe) for Unit 3.

- a. Explain how the main generator for Unit 3 will operate within its generating capability curve if its electrical power output is higher than its electrical rating; and discuss the impact of the higher electrical output on the main generator and its protective devices. Also, provide the gross generator output in MWe for the summer and winter operations for Units 2 and 3, as

well as the main generator capability curve for both Units 2 and 3. Using the main generator capability curve for both Units 2 and 3, provide a discussion to demonstrate that the generator will continue to operate within the limits of its capability curve.

- b. Table 6-2 of the TSAR shows a 1,530 megavolt amperes (MVA) rating for the main generator in each PBAPS unit. Provide the MVA loadings for the Unit 2 and Unit 3 main generators at TPO conditions and provide a discussion that demonstrates the main generators are adequately sized to support TPO uprate operations.

RAI-EEOB-2

In Table 6-1, "Plant Electrical Equipment Ratings," of the TSAR, the licensee provided the ampere ratings for the isolated phase bus duct (generator bus, main section, delta section, and auxiliary section). Section 6.1.1 of the TSAR states that the isolated phase bus duct is adequate for both rated voltage and low voltage current output.

Provide the TPO uprate loadings for the generator bus, main section, delta section, and auxiliary section of the isolated phase bus and provide a discussion that demonstrates the isolate phase bus duct is adequately rated for TPO uprate conditions.

RAI-EEOB-3

In Section 6.1.1 of the TSAR, the licensee stated that the grid voltage analysis for the PBAPS TPO uprate, which was performed by PECO, verified the transmission system's capability to maintain the post-trip voltage drops and voltages at the safety buses above the reset value of the degraded voltage relay (DVR) on a steady-state basis. The PECO grid voltage analysis report for PBAPS Units 1 and 2 TPO uprate is provided in Attachment 13 of the license amendment request.

Provide the reset voltage of the DVR on a steady-state basis, and using two results of the simulated worst-case voltage drops and voltages provided in Section 3, "Study Results," of Attachment 13, provide a discussion that demonstrates the transmission system will maintain the post-trip voltage drops and voltages at the safety buses above the reset value of the DVR at TPO operating conditions.

RAI-EEOB-4

In Section 9.3.2 of the TSAR, the licensee stated that the station blackout (SBO) event was previously analyzed for the extended power uprate EPU, and a plant-specific analysis was performed to confirm continued compliance to 10 CFR 50.63 at TPO RTP conditions. The licensee did not provide the above-mentioned plant-specific analysis. The NRC staff notes that the current SBO analysis for PBAPS was evaluated at 100% of the current licensed thermal power level (i.e., 3,951 MWt), as stated in UFSAR Section 5.2.4.3.1.

Since the licensee proposed to increase the PBAPS thermal power to approximately 4,016 MWt (approximately 1.66% increase in RTP), provide a summary of the plant-specific SBO analysis for the proposed MUR thermal power (4,016 MWt) and provide a discussion of how PBAPS continues to meet 10 CFR 50.63.

RAI-EEOB-5

In Section 10.3, "Environmental Qualification," of the TSAR, the licensee provided the evaluation for some but not all of the environmental conditions (e.g., temperature, pressure, and humidity) reviewed for safety-related electrical equipment to ensure that the existing qualification for the normal and accident conditions expected in the area where the equipment is located remain adequate.

Discuss the impact of the TPO uprate on 1) the normal pressures inside containment, 2) the normal temperatures and pressures outside containment, and 3) the humidity levels inside and outside containment for normal and accident conditions.