From:	Ennis, Rick
Sent:	Monday, July 10, 2017 9:58 AM
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 (CAC NOS. MF9289 AND MF9290)
Attachments:	final02 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 22, 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.

A conference call between the NRC staff and the Exelon staff was held on July 10, 2017, to discuss the draft RAI questions. Based on this call, RAI-SRXB-1 was withdrawn since the information needed has already been docketed. Mr. Neff stated that Exelon would provide a response to the RAI questions by August 9, 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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Reactor Systems Branch (SRXB)
Reviewers: Muhammad Razzaque (RAIs 1-4) and Ahsan Sallman (RAIs 5-15)

SRXB-RAI-1

Question withdrawn.

SRXB-RAI-2

On page 3-16 of the TSAR[1], it states that:

> The conclusion in the LOFW [loss-of-feedwater] analysis-of-record based on SAFER/GSTRM will remain valid with SAFER/PRIME as the water level response between the SAFER/GSTRM and the SAFER/PRIME methodologies are expected to be essentially the same.

The NRC staff understands that the currently approved thermal conductivity degradation (TCD) model is incorporated in the PRIME code, not in the GSTRM code. The staff also believes that degraded fuel thermal conductivity may result in higher fuel stored energy, and that this additional stored energy as an initial condition in the fuel may lead to a higher boil-off rate resulting in a reduced water level in the core during a LOFW event. Explain why TCD is expected to have no impact on the calculation of water level during a LOFW event.

SRXB-RAI-3

In Section 4.2, "Emergency Core Cooling Systems (ECCS)," of Attachment 14 to the LAR (i.e., redline/strikeout of the TSAR), the statement below was deleted for the High Pressure Coolant Injection (HPCI) system, the Core Spray (CS) system and the Low Pressure Coolant Injection (LPCI) system:

> The ability of the ……. system to perform required safety functions is demonstrated with previous analyses based on 102% of CLTP. Therefore, all safety aspects of the …… system are within previous evaluations and the requirements are unchanged for TPO uprate conditions.

For the Automatic Depressurization System (ADS), the statement was replaced by a similar statement. Explain why the above statement is not valid for the HPCI, CS, and LPCI systems of the ECCS.

SRXB-RAI-4

In Table 9-2 of the TSAR, results for the anticipated transient without scram (ATWS) analysis at TPO were provided. Provide the following additional information:

a. Specify at which state point in the power/flow map (TSAR Figure 1-1a) the following limiting results occur at TPO power:

   i) Peak vessel bottom pressure
   ii) Peak cladding temperatures for ATWS and ATWS with instability (ATWSI)

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1 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.

If the state points are different from that of the current analysis-of-record for CLTP/MELLLA+, explain the reason.

SRXB-RAI-5

The table in Section 4.1 of the TSAR does not provide any information regarding the containment temperature response for Equipment Environmental Qualification (EEQ). For the CLTP level (i.e., EPU thermal power level), the most limiting containment temperature response for the EEQ of equipment was obtained in the long term analysis for a Small Steam Line Break (SSLB) accident. Provide the analysis results, including the limiting break size under the TPO uprate condition.

SRXB-RAI-6

The table in Section 4.1 of the TSAR does not provide any information regarding the peak containment wall temperature for structural analysis. For the CLTP level (i.e., EPU thermal power level), the most limiting containment wall temperature was obtained in the long term analysis for a SSLB accident. Provide the analysis results, including the limiting break size under the TPO uprate condition.

SRXB-RAI-7

With respect to TSAR Section 4.1.2, provide justification why the TPO uprate is determined to have no effect on the current evaluation of Generic Letter (GL) 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves."

SRXB-RAI-8

NRC GL 96-06, "Assurance of Equipment Operability and Containment Integrity during Design-Basis Accident Conditions," identifies the following potential problems with equipment operability and containment integrity during design-basis accident (DBA) conditions: (1) cooling water systems serving the containment air coolers may be exposed to water hammer during postulated accident conditions; (2) cooling water systems serving the containment air coolers may experience two-phase flow conditions during postulated accident conditions; and (3) thermally induced over-pressurization of isolated water-filled piping sections in containment could jeopardize the ability of accident-mitigating systems to perform their safety functions and could also lead to a breach of containment integrity via bypass leakage. GL 96-06 questioned whether the higher heat loads at accident conditions could potentially cause steam bubbles, water hammer, and two-phase flow due to the higher outlet temperatures from cooled components, particularly the containment fan coolers.

With respect to TSAR Section 4.1.4, provide justification why the TPO uprate does not affect the current evaluation of the problems identified in GL 96-06 described above.

SRXB-RAI-9

With respect to TSAR Section 4.1.5, provide justification why the TPO uprate is determined to have no effect on the GL 89-16, "Installation of a Hardened Wetwell Vent."

SRXB-RAI-10

Section 4.2.5 of the TSAR states:

> A conservative error was identified in the NPSH [net positive suction head] evaluations for Appendix R Cases A1, C1A and C1B at EPU conditions. These evaluations should have used a service water (SW) temperature of 86°F as indicated in Table 9.2f of the EPU LAR, but instead used 92°F, and therefore have been re-performed with the corrected temperature. The SW temperature of 92°F is a TS limit, while 86°F is a nominal value based on a statistical analysis of a five-year sampling of data for the months of June, July, August and September.

a. Indicate the Attachment number to the EPU LAR letter dated September 28, 2012, to which Table 9.2f belongs. Note that the Table 2.5-1 of the Attachment 6 to the EPU LAR letter dated September 28, 2012 (i.e., PUSAR), states the correct SW temperature of 86°F.

b. Table 2.5-1 of Attachment 6 of EPU LAR dated September 28, 2012, provides Appendix R fire event key input parameters including the SW temperature of 86°F. As stated above, the EPU analysis was erroneously performed using a SW temperature of 92°F instead of 86°F. Confirm that in the revised analysis at the TPO uprate, the remaining parameters, besides core thermal power and SW temperature, listed in Table 2.5-1 of the PUSAR, were not changed. If parameters were changed, provide justification in case the change in any of the parameters reduces the conservatism in the suppression pool temperature response.

SRXB-RAI-11

With respect to TSAR Section 9.3.1.2, please provide justification for the statement in the first sentence of the third paragraph (last paragraph on page 9-3) regarding the loss-of-offsite power (LOOP) event.

SRXB-RAI-12

With respect to TSAR Section 9.3.1, explain the basis for the acceptance criteria of the limiting temperature 180°F of the containment structure and justify that it is conservative. In addition, provide the Heat Capacity Temperature Limit (HCTL) at the normal suppression pool level and the Safety-Relief Valve (SRV) opening pressure.

SRXB-RAI-13

With respect to TSAR Section 9.3.1.6; with the boron injection rate remaining unchanged from CLTP to TPO, it is not clear from the CLTR (ADAMS Accession No. ML032170332) that the suppression pool temperature following an ATWS event meets all CLTR dispositions. Please explain and provide the section number of the CLTR which mentions this disposition.

SRXB-RAI-14

TSAR Section 10.1 states:

> Vessel dome pressure and other portions of the RCPB [Reactor Coolant Pressure Boundary] remain at current operating pressure or lower.

Describe the portions of the RCPB under the TPO conditions that would be operating at a lower pressure than the operating pressure at the CLTP, and provide reason(s).

SRXB-RAI-15

TSAR Section 10.1, second paragraph states:

> At the TPO RTP, HELBs [High Energy Line Breaks] outside the drywell would result in an insignificant change in the sub-compartment pressure and temperature profiles. The affected building and cubicles that support safety-related functions are designed to withstand the resulting pressure and thermal loading following a HELB at the TPO RTP.

Please explain why there would be a change in the sub-compartment pressure and temperature profiles at the TPO uprate conditions. Also explain why the change is insignificant compared to the current profiles and the existing design margins.