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

March 27, 2015

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

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNIT 2 - NRC STAFF REVIEW OF REQUEST FOR APPROVAL OF REVISION TO METHODOLGY FOR ESTABLISHING REPLACEMENT STEAM DRYER STRAIN LIMITS (TAC NO. MF4792)

Dear Mr. Hanson:

On August 25, 2014, the Nuclear Regulatory Commission (NRC) issued Amendment Nos. 293 and 296 to Renewed Facility Operating License Nos. DPR-44 and DPR-56 for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14133A046). These amendments authorized an increase in the maximum licensed thermal power level for PBAPS, Units 2 and 3, from 3514 megawatts thermal (MWt) to 3951 MWt, which is an increase of approximately 12.4%. This change in power level is considered an extended power uprate (EPU).

The NRC staff approval of the EPU was based, in part, on the capability for Exelon Generation Company, LLC (Exelon, the licensee) to monitor, evaluate, and take prompt action in response to potential adverse flow effects as a result of EPU operation on plant structures, systems, and components (including verifying the continued structural integrity of the replacement steam dryer (RSD)). License condition 2.C(15) was added to the facility operating license for each unit, as part of the EPU amendment, to provide the necessary requirements associated with potential adverse flow effects. This license condition requires, in part, that the licensee benchmark the RSD stress analysis methodology using data collected at or near 3514 MWt. This benchmarking effort establishes the PBAPS Unit 2 RSD strain limits that will be used as acceptance criteria for power ascension above 3514 MWt. The license condition also requires that the methodology for establishing the RSD strain limits not be made less restrictive without prior NRC approval.

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

Exelon implemented the EPU during the fall 2014 refueling outage for PBAPS Unit 2. Since about mid-December 2014, PBAPS Unit 2 has been holding at about 3514 MWt (89% of the current licensed power level of 3951 MWt, or 100% of the pre-EPU license power level) as part of the RSD benchmarking effort. As described in Exelon's letter dated February 3, 2015 (ADAMS Accession No. ML15034A573), RSD strain gauge measurements, collected near 3514 MWt, identified strain responses in the low frequency range that were not previously predicted. As a result, the licensee developed an approach to quantify the magnitude of the unpredicted loads and integrate the results into the original methodology. In accordance with PBAPS Unit 2 license condition 2.C(15)(d)3, Exelon's letter requested NRC approval for this revision to the methodology for establishing the RSD strain limits. Exelon provided supplemental information in a letter dated March 24, 2015 (ADAMS Accession No. ML15083A559).

The NRC staff has reviewed the information provided in Exelon's letters dated February 3, 2015, and March 24, 2015. The revised methodology contains a certain degree of conservatism that provides reasonable assurance of the structural integrity of the RSD for power ascension up to 104% of 3514 MWt. Nonetheless, the technical approach involves approximations leading to uncertainties that preclude a finding of assurance, at this time, of satisfactorily maintaining the required American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (Code), Section III endurance limit of 13,600 pounds-force per square inch (psi) at the full EPU level.

Based on the above considerations, the NRC staff approves the resumption of power ascension for PBAPS Unit 2 to the next hold point specified in license condition 2.C(15) (i.e., 104% of 3514 MWt). Further power ascension of PBAPS Unit 2 beyond 104% of 3514 MWt will be contingent upon continued demonstration of the structural integrity of the RSD in accordance with the provisions in license condition 2.C(15). In addition, the staff has determined that additional information, as described in Enclosure 1, needs to be provided to help inform the staff's decision on the acceptability of power ascension beyond 104% of 3514 MWt. This request for additional information (RAI) was provided in draft form to Exelon on March 19, 2015. In addition, the RAI was discussed during a meeting between Exelon and the NRC on March 26, 2015. Based on a discussion between the NRC staff (Mr. Richard Ennis) and Exelon (Mr. Ken Ainger) on March 27, 2015, Exelon agreed to provide the RAI response no later than the date that the steam dryer evaluation, performed based on data collected at 104% of 3514 MWt, is provided to the NRC in accordance with license condition 2.C(15).

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 regarding this matter, you may contact the PBAPS Project Manager, Mr. Richard Ennis, at 301-415-1420.

Sincerely,

Louis Lund for

Michele G. Evans, Director
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-277

Enclosures:
1. Request for Additional Information (non-publicly available)
2. Request for Additional Information (publicly available)

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REQUEST FOR ADDITIONAL INFORMATION

REGARDING REPLACEMENT STEAM DRYER ANALYSIS

EXELON GENERATION COMPANY, LLC

PEACH BOTTOM ATOMIC POWER STATION - UNIT 2

DOCKET NO. 50-277

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

On August 25, 2014, the Nuclear Regulatory Commission (NRC) issued Amendment Nos. 293 and 296 to Renewed Facility Operating License Nos. DPR-44 and DPR-56 for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14133A046). These amendments authorized an increase in the maximum licensed thermal power level for PBAPS, Units 2 and 3, from 3514 megawatts thermal (MWt) to 3951 MWt, which is an increase of approximately 12.4%. This change in power level is considered an extended power uprate (EPU).

By letter dated February 3, 2015, as supplemented by letters dated March 24, 2015 (ADAMS Accession Nos. ML15034A573 and ML15083A559, respectively), Exelon Generation Company, LLC (Exelon, the licensee) requested NRC approval of a revision to the methodology, previously approved during the EPU review, for establishing the PBAPS Unit 2 replacement steam dryer (RSD) strain limits. Exelon's request was submitted to support the continuation of EPU power ascension above 3514 MWt.

The NRC staff has reviewed the information the licensee provided in Exelon's letters dated February 3, 2015, and March 24, 2015, and has determined that there is reasonable assurance that the PBAPS Unit 2 RSD will maintain its structural integrity for continued power ascension to the next hold point specified in license condition 2.C(15) (i.e., 104% of 3514 MWt). However, the staff has determined that additional information, as described below, needs to be provided to help inform the staff's decision on the acceptability of power ascension beyond 104% of 3514 MWt.

Request for Additional Information (RAI) questions 1 through 9, regarding the revision to the methodology, were addressed in Exelon's letter dated March 24, 2015. As such, this RAI is designated as RAI-10.

RAI-10

The NRC staff has the following observations on the information submitted so far:

- Using [[ ]] to infer the alternating stress state in a steam dryer is, in principle, acceptable.

- Statistical studies of the peak measured strains on the dryer hood and skirt by the licensee appear to show that [[ ]] is consistent with guidelines in NUREG 0484. The licensee indicated that cumulative distribution function (CDF) curves were developed, [[ ]] To further validate the licensee's findings from its analysis, the NRC staff requests that the CDF curves for SG4 and SG20 be provided for review.

- The [[ ]] does not have a sound technical basis. Therefore, this raises concerns regarding the stress analysis of the PBAPS Unit 2 steam dryer. All [[ ]]) do not seem to be included in the current analysis, raising the concern that the [[ ]] may not be an appropriate upper bound. Also, the [[

]] These problems with the approach used to date lead to [[ ]] adding further uncertainty to the accuracy of the current calculations.

The general methodology as submitted by the licensee is reasonable, but the [[ ]] must be complete and representative of [[ ]] strains and stresses in all major dryer components (outer hoods, inner and middle hoods, and skirt), and the approach used to determine the [[ ]] in the analysis must be revised as follows:

a) Due to possible inaccuracies in the [[ ]], a frequency shift of at least +/-10% must be considered to ensure that all [[ ]] are included in the analyses.

b) [[ ]] used in the analysis should be submitted, and demonstrated to be reasonable for use on the outer hood, middle/inner hood, and skirt, regardless of whether the [[ ]]

c) The [[ ]] should be based on attempting to match as closely as possible [[ ]][1]

d) The simulated [[ ]] should bound the measured ones.

e) Simulated [[ ]] should be reasonably consistent with those measured.

f) The [[ ]] must be used to estimate the top 5 maximum stresses and their locations on the upper and lower dryer.

g) For each of the [[ ]], please provide [[ ]] at each of the strain gage locations on the hood.

h) Please confirm whether the outer hood, middle hood and inner hood are dynamically coupled.

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[1] [[

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If you have any questions regarding this matter, you may contact the PBAPS Project Manager, Mr. Richard Ennis, at 301-415-1420.

Sincerely,

/RA LLund For/

Michele G. Evans, Director
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-277

Enclosures:
1. Request for Additional Information (non-publicly available)
2. Request for Additional Information (publicly available)

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ADAMS Accession Nos.: Package: ML15086A310
Letter: ML15033A489 (publicly available)
Enclosure 1: ML15086A328 (non-publicly available)
Enclosure 2: ML15086A333 (publicly available) *via e-mail

OFFICE	LPL1-2/PM	LPL1-2/LA*	LPL1-2/BC(A)	EMCB/BC(A)	DE/SLA	DE/D	DORL/D
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