



March 17, 2014

U. S. Nuclear Regulatory Commission
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Peach Bottom Atomic Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-44 and DPR-56
NRC Docket Nos. 50-277 and 50-278

Subject: Extended Power Uprate License Amendment Request – Supplement 23
Response to Request for Additional Information – Extended Power Uprate

Reference: 1. Exelon letter to the NRC, "License Amendment Request - Extended Power Uprate," dated September 28, 2012 (ADAMS Accession No. ML122860201)

2. Letter from K. F. Borton (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "Extended Power Uprate License Amendment request – Supplement 12 Response to Request for Additional Information," dated October 11, 2013 (ADAMS Accession No. ML13289A191)

In accordance with 10 CFR 50.90, Exelon Generation Company, LLC (EGC) requested amendments to Renewed Facility Operating License Nos. DPR-44 and DPR-56 for Peach Bottom Atomic Power Station (PBAPS) Units 2 and 3, respectively (Reference 1). Specifically, the proposed changes would revise the Renewed Facility Operating Licenses to implement an increase in rated thermal power from 3514 megawatts thermal (MWt) to 3951 MWt.

The attachment to this letter provides EGC's response to the Mechanical and Civil Engineering Branch (EMCB) Request for Additional Information No. 37.

EGC has reviewed the information supporting a finding of no significant hazards consideration and the environmental consideration provided to the U. S. Nuclear Regulatory Commission in Reference 1. The supplemental information provided in this submittal does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. Further, the additional information provided in this submittal does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

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In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the Commonwealth of Pennsylvania and the State of Maryland of this application by transmitting a copy of this letter along with the attachments to the designated State Officials.

There are no regulatory commitments contained in this letter.

Should you have any questions concerning this letter, please contact Mr. David Neff at (610) 765-5631.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 17th day of March 2014.

Respectfully,

A handwritten signature in black ink, appearing to read 'K. Borton', with a horizontal line extending to the right.

Kevin F. Borton
Manager, Licensing – Power Uprate
Exelon Generation Company, LLC

Attachment 1 -Response to Mechanical and Civil Engineering Branch Request for
Additional Information No. 37

cc:	USNRC Region I, Regional Administrator	w/attachments
	USNRC Senior Resident Inspector, PBAPS	w/attachments
	USNRC Project Manager, PBAPS	w/attachments
	R. R. Janati, Commonwealth of Pennsylvania	w/attachments
	S. T. Gray, State of Maryland	w/attachments

Attachment 1
Peach Bottom Atomic Power Station Units 2 and 3
NRC Docket Nos. 50-277 and 50-278

Response to Mechanical and Civil Engineering Branch
Request for Additional Information No. 37

Response to Request for Additional Information
Mechanical and Civil Engineering Branch (EMCB)

By letter dated September 28, 2012, Exelon Generation Company, LLC (EGC) 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. Supplement 12 to the license amendment request, submitted to the NRC on October 11, 2013, (ADAMS Accession No. ML 13289A 191) provided responses to EMCB RAI Nos. 1 through 24. In an email dated February 27, 2014, from the NRC (Rick Ennis) to Exelon (Kevin Borton and Dave Neff), the NRC provided an RAI seeking information related to the response to EMCB-18 in Supplement 12. This attachment provides the response to that RAI.

EMCB-RAI-37

The licensee's response to NRC request for additional information (RAI) EMCB-RAI-18 in Supplement 12 to the EPU license amendment request dated October 11, 2013, stated, in part that:

Vibration susceptibility assessments of small bore branch piping in systems experiencing significant flow increases due to EPU are being completed prior to EPU power ascension. These assessments identify potentially susceptible configurations using various screening criteria and are supplemented by walkdowns to confirm the small bore line configurations. Initial assessments and confirmatory walkdowns have been completed for the Unit 2 small bore piping. Based on the results of these assessments and walkdowns, a large majority of the small bore lines were determined to be not susceptible to increased header-induced vibrations based on the established screening criteria and require no further action. For the remaining small bore lines, further evaluations are now being performed to better determine vibration susceptibility and the need for any support and/or piping modifications. The additional evaluations and development of any required modification designs will be completed in time to support installation of the modifications prior to EPU power ascension. The initial assessments and confirmatory walkdowns for the Unit 3 small bore lines are currently in progress. Based on the work completed to date, the Unit 3 results are expected to be similar to those for Unit 2.

The necessary monitoring, analyses and modifications to address potential piping vibration vulnerabilities are being performed to ensure there will be no adverse effects at EPU operating conditions.

With respect to the work being performed by the licensee to evaluate the potential impact of flow-induced vibration for small bore piping, as a result of the proposed EPU, please provide the following information:

- a) List the systems of the small bore branch piping that were selected for screening and walkdowns.

- b) Discuss the method and the screening criteria established to assess vibration susceptibility of small bore piping.
- c) How does the screening indicate that further evaluations are required and what methodology do the additional evaluations employ?
- d) Have the additional evaluations, mentioned in the EMCB-RAI-18 response, been completed? What modifications, if any, were required as a result of these evaluations?

RESPONSE

- a) The following systems were selected for screening and walkdowns to evaluate the potential impact of flow-induced vibration (FIV) for small bore piping, due to the system's increased flow rates as a result of the proposed EPU:
 - 1) Main Steam,
 - 2) Feedwater,
 - 3) Condensate,
 - 4) Extraction Steam, and
 - 5) Heater Drain.
- b) A systematic process to assess vibration susceptibility of the small branch lines in the selected systems was performed for PBAPS Unit 2 and Unit 3. The assessment was conducted separately for Unit 2 and Unit 3. The lines were categorized into various configuration types and then evaluated using specific screening criteria. The EPRI Fatigue Management Handbook (Reference 37-1) was used as a basis for this assessment. Verification walkdowns to confirm the configurations of the small bore piping in the selected systems were conducted on Unit 2 and Unit 3 during outages in 2012 and 2013, respectively.

The small bore lines were categorized as either cantilevered or complex configurations and then grouped into subcategories within those two configuration types. Cantilevered branch lines include one or more isolation valves or other masses that terminate a short distance from the large bore header without additional support. Complex branch lines feature spans that are supported in one or more additional locations beyond the large bore takeoff.

The following screening criteria were used to assess vibration susceptibility of the small bore branch lines as a result of EPU implementation:

- 1) Branch Lines Mounted to Well-Restrained Components or Piping (Cantilevered and Complex Configurations). A number of the identified small bore lines in the scope of this assessment are mounted near the inlet or outlet nozzles of pumps and heat exchangers. These components are rigidly anchored to the plant structure, and should not experience increased FIV during EPU operation, regardless of their configuration type. Thus, implementation of EPU will not impact the vibration susceptibility of these lines.
- 2) Branch Lines on Header Piping with Minimal Predicted Flow Increase (Cantilevered and Complex Configurations). For individual large bore lines that do not experience an appreciable change in flow rate as a result of EPU, levels of FIV are expected to be nearly identical to present operation. Thus, implementation of EPU will not impact the vibration susceptibility of these lines.

- 3) Non-Susceptible Cantilevered Configurations. Cantilevered lines are most susceptible to vibration when they contain large unsupported masses or feature long spans of piping. Cantilevered branch lines that are short and/or support little suspended mass will not experience vibration-related failures. Thus, implementation of EPU will not impact the vibration susceptibility of these lines.
- 4) Cantilevered Lines with High Natural Frequencies. Cantilevered lines that did not fall within the non-susceptible configurations of item 3) above were evaluated on the basis of their calculated natural frequency. Cantilevered lines with natural frequencies above anticipated header vibration frequencies are considered to be not susceptible to EPU-related FIV concerns.
- 5) Complex Lines with Minimal Suspended Mass. Complex lines that do not support additional mass between the branch connection and the first support are not a concern for resonant excitation and are considered to be not susceptible to EPU-related FIV concerns.
- 6) Complex Lines with Balanced Support Configuration. Assessment of these lines was performed by qualitatively assessing their support configuration and verifying a balance between flexibility and rigidity. Balanced configurations are considered to be not susceptible to EPU-related FIV concerns.

Each small bore branch line was evaluated against the above screening criteria and assigned an EPU FIV susceptibility rating. Lines that met one or more of the screening criteria were considered to have a low probability of vibration susceptibility. Lines that did not meet at least one of the screening criteria were considered to have a higher probability of vibration susceptibility and warranted further evaluation.

- c) Small bore lines with high EPU FIV susceptibility ratings were subjected to additional evaluations that included detailed focused reviews of the specific configurations, the creation of detailed piping models of representative (bounding) versions of the lines, and/or modal analyses to more accurately determine the first mode frequency.
- d) The additional evaluations have been completed. Minor modifications are being implemented as a result of the evaluations. For Unit 2, two small bore branch line configurations, corresponding to eight individual lines, are being modified to include tie-back supports and/or other modifications to increase the natural frequency of the small bore lines. For Unit 3, four small bore branch line configurations, corresponding to 15 individual lines, are being modified. The modifications being made to Unit 3 are similar to those being made to Unit 2.

Reference

- 37-1 Materials Reliability Program: Fatigue Management Handbook, Revision 1 (MRP-235). EPRI, Palo Alto, CA: 2008. EPRI Proprietary Licensed Material.