



September 13, 2013

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

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 11
Response to Request for Additional Information

- References:**
1. Exelon letter to the NRC, "License Amendment Request - Extended Power Uprate," dated September 28, 2012 (ADAMS Accession No. ML122860201)
 2. NRC letter to Exelon, "Request for Additional Information Regarding License Amendment Request for Extended Power Uprate (TAC Nos. ME9631 and ME9632)," dated August 15, 2013 (ADAMS Accession No. ML13221A064)

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 Operating Licenses to implement an increase in rated thermal power from 3514 megawatts thermal (MWt) to 3951 MWt. During their technical review of the application, the NRC Staff identified the need for additional information. Reference 2 provided the Request for Additional Information (RAI).

This letter addresses requests from the staff of the Human Performance Branch (AHPB) of the U. S. Nuclear Regulatory Commission to provide information in support of the request for amendment for the extended power uprate. During a teleconference between Mr. Neff of EGC and Mr. Ennis of the NRC conducted on September 9, 2013, it was agreed that EGC would provide a response to requests AHPB-HP-RAI-1 and AHPB-HP-RAI-2 by October 15, 2013. Responses to requests AHPB-HP-RAI-3 and AHPB-HP-RAI-4 are provided in the Attachment to this letter.

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

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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.

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 non-proprietary 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 13th day of September 2013.

Respectfully,



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

Attachment:

Response to Request for Additional Information – AHPB-HP

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

Attachment

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Response to Request for Additional Information – AHPB-HP

Response to Request for Additional Information

Health Physics and Human Performance Branch

By letter dated September 28, 2012, Exelon Generation Company, LLC (Exelon) 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 the information supporting the proposed amendment and by letter dated August 15, 2013 (ADAMS Accession No. ML13221A064) has requested additional information. The response to that request, except for RAIs 1 and 2 is provided below. A response to RAIs 1 and 2 will be provided by October 15, 2013.

AHPB-HP-RAI-3

PUSAR page 2-514, 1st paragraph, and Table 2.10-2, indicate that the post-EPU N-16 skyshine dose rate at the nearest boundary is negligibly small. Provide a quantitative basis for this conclusion. Provide all input parameters (e.g., source strength, exposure geometries, distance to nearest boundary) needed to calculate the skyshine contribution to the most exposed member of the public during EPU operations.

RESPONSE

In accordance with 10 CFR 20.1302(b)(1), PBAPS uses dosimetry measurements to demonstrate compliance with the 100 mrem per year annual dose limit. Consequently, PBAPS does not maintain an explicit N-16 skyshine dose calculation.

The EPU dose evaluation utilizes measured data, taken from the dosimetry location nearest the turbine hall, to quantify the skyshine dose contribution. The location nearest the turbine hall is appropriate because the N-16 skyshine dose is a function of distance from the source, and the skyshine dose decreases with increasing distance.

Figure 3-1 is an aerial view of the PBAPS site, and it is annotated to show the PBAPS Offsite Dose Calculation Manual (ODCM) (Reference 1) Table VII.A-1 dosimetry locations. Figure 3-1 shows that on-site location 1L is the dosimetry location nearest the turbine hall - approximately 1,250 feet north-east.

Table 3-1 presents the measured total dose (background, direct gamma, and skyshine gamma) from location 1L, and it also displays the measured background dose from the off-site control locations (16, 18, 19, and 24), which are between 5 and 20 miles from the station. The Table 3-1 values are taken from the appropriate Annual Radiological Environmental Operating Report, References 2 and 3.

Table 3-1
 PBAPS Measured Doses

Location	Dose (mrem/yr)	
	Year 2011	Year 2010
1L	56.4	55.2
16	67.2	66.0
18	57.6	67.2
19	64.8	62.4
24	52.8	52.8

As shown in Table 3-1, the total gamma dose measured at location 1L is indistinguishable above the background dose. Given that the measured data includes both direct gamma dose and the skyshine gamma dose, this measured data supports the conclusion that the skyshine gamma dose at location 1L is negligible.

Because the location 1L dose was measured while hydrogen water chemistry (HWC) was operating at both units, the measured data includes the HWC contribution to N-16 skyshine. As described by PUSAR Section 2.10.1.2.1, this HWC dose does not increase with EPU.

Figure 3-1 also shows location 1E, the dosimetry location corresponding to the public access point nearest the station - approximately 3,000 feet north-west of the turbine hall. Because this location is further from the source than location 1L, the skyshine gamma dose at location 1E must be lower than at location 1L. Because the skyshine gamma dose at location 1L is negligible, the skyshine dose to a member of the public at location 1E is also negligible.

For EPU, the N-16 dose is assumed to increase by no more than 30% as described by PUSAR Section 2.10.1.2.1 and the Supplemental Environmental Report Attachment 8, Section 8.2.2 (Reference 4). Because the current measured skyshine dose is negligible, the EPU PUSAR concludes that with a 30% increase, the measured skyshine dose to a member of the public will continue to remain negligible.

References:

1. Peach Bottom Atomic Power Station Units 2 and 3, Offsite Dose Calculation Manual, Revision 14.
2. Peach Bottom Atomic Power Station Units 2 and 3, Annual Radiological Environmental Operating Report, Report No. 69, 1 January Through 31 December 2011, ML12153A208.
3. Peach Bottom Atomic Power Station Units 2 and 3, Annual Radiological Environmental Operating Report, Report No. 68, 1 January Through 31 December 2010, ML11152A159.
4. Exelon letter to the NRC, "License Amendment Request – Extended Power Uprate," dated September 28, 2013 (ML122860201), Attachment 8.

Figure 3-1
PBAPS On-Site and Near-Site Dosimetry Locations



AHPB-HP-RAI-4

Table 2.10-2 on PUSAR page 2-518 presents calculated offsite doses at pre-EPU and EPU power levels.

- a) Are the input parameters used in these calculations consistent with the current Offsite Dose Calculation Manual (e.g., land use, meteorology, dose pathways, etc.)?
- b) Columns 3 and 4 are both calculated at 3528 MWt. However, the calculated doses are significantly different. Explain the differences in these two cases that cause these inconsistent results.
- c) Provide calculation PM-791 referenced in column 3 (Reference 105).
- d) What is the purpose of presenting the doses in column 4?
- e) Explain why the doses calculated for 4030 MWt (column 5) are significantly lower than the corresponding doses calculated at 3528 MWt (in column 4). Provide a technical basis for the acceptability of the dose results in column 5.
- f) Explain why a 5-year average dose is presented in column 6 of the table. Provide a technical basis for not listing the maximum value for each of these doses, or provide these maximum values for the 5 year period referenced.

RESPONSE

Introduction

Table 4-1 is provided in order to clarify PUSAR Table 2.10-2. Table 4-1 contains the same data as PUSAR Table 2.10-2 but has one additional column (Column 4a) and now includes the maximum dose values substituted within Column 6.

Table 4-1 (and PUSAR Table 2.10-2) Column 2 shows the doses for the plant's original licensing basis as calculated in 1976 by PUSAR Reference 104. These doses were computed using pre-release versions of the GALE, LADTAP, and GASPAP computer codes. The pre-release version of Reg Guide 1.109 was also utilized to generate the Column 2 doses.

Table 4-1 (and PUSAR Table 2.10-2), Column 3 shows the doses for the plant's stretch uprate to CLTP as calculated in 1993 by PUSAR Reference 105. The values in Column 3 were calculated by scaling the values in Column 2 for the increase in thermal power, conservatively by 5%.

Table 4-1 (and PUSAR Table 2.10-2), Column 4 shows the doses for CLTP, calculated with the latest versions of the LADTAP and GASPAP computer codes and in accordance with Reg Guide 1.109 Rev 1. The comparison of Column 4 with Column 3 shows the effect of changing computer codes and Reg Guide versions for CLTP.

Table 4-1, Column 4a shows the doses for CLTP, but as calculated using ANSI/ANS-18.1-1999 source term. Because Column 4a applies the same codes and Reg Guide as Column 4, the comparison of Column 4a with Column 4 shows the effect of changing the source term.

Table 4-1 (and PUSAR Table 2.10-2), Column 5 shows the doses computed for EPU. The comparison of Column 5 against Column 4a shows the effect due to EPU.

Specific Responses

- a) The EPU input parameters, used to compute the dose results within PUSAR Table 2.10-2, are consistent with the ODCM (Reference 1). These include:
- Land use such as site boundary direction and distance.
 - Meteorology such as atmospheric dispersion factors and ground deposition values.
 - Pathway doses such as fish ingestion, drinking ingestion, cows' milk ingestion, and gaseous inhalation.
 - Pathway dose conversion factors from Reg Guide 1.109 Rev 1.

While many of the EPU inputs match the ODCM, the EPU calculation is intended to be a bounding design basis calculation, and it contains many conservatisms relative to the ODCM. These conservatisms include no dilution for some pathways and minimized transit times.

- b) The CLTP calculations were re-performed using the latest codes and source term. As described in the Introduction, Table 4-1, Column 4 shows the effects of the new codes and Reg Guide 1.109 Rev. 1 upon the existing CLTP dose calculation, Table 4-1, Column 4a shows the effect of the new source term upon the existing CLTP dose calculation, and Table 4-1, Column 5 shows the EPU effect.
- c) During the clarification call with the NRC staff conducted on August 8, 2013, regarding this request, it was agreed that an explanation would be sufficient in lieu of the requested calculation. The values in Column 3 were calculated by scaling the values in Column 2 for the increase in thermal power. PUSAR Reference 105 does not alter the inputs, methods, assumptions, or conservatisms from PUSAR Reference 104; consequently, the description provided herein fully describes the PUSAR Reference 105 calculation.
- d) As described above, Table 4-1, Column 4 and 4a are necessary to show the effects of the code and source term changes separate from the EPU change.
- e) The EPU doses shown in the original PUSAR Table 2.10-2 reflect both the change in source term and the change in power. The effects from the change in source term dominate the effects from the change in power; therefore, PUSAR Table 2.10-2 Column 5 generally shows a decrease in dose.

As described above, Table 4-1, Column 4a is now added to separate the source term change from the power change. A comparison of Table 4-1, Column 5 to Column 4a shows only the EPU effect upon the calculated doses.

- f) Table 4-1, Column 6, is updated to show the maximum dose values from the referenced 5 year period.

Reference:

1. Peach Bottom Atomic Power Station Units 2 and 3, Offsite Dose Calculation Manual, Revision 14.

TABLE 4-1
Updated PUSAR Table 2.10-2

10CFR50 Appendix I Dose Analysis							
Type of Dose	Maximum Public Individual Doses for Gaseous and Liquid Releases						
	Previous Design Bases 3440 MWt (Reference 104)	Current Power Current Design Bases 3528 MWt (Reference 105)	Current Power Current Design Bases Source Term & Updated (Current) NRC Regulatory Guidance 3528 MWt	Current Power Updated (Current) Design Bases Source Term & Updated (Current) NRC Regulatory Guidance 3528 MWt	EPU Updated (Current) Design Bases Source Term & Updated (Current) NRC Regulatory Guidance 4030 MWt	Actual Plant Data Effluent Release Maximums From 2005 to 2009 (References 106 - 110)	10 CFR 50 Appendix I Design Objectives
Column 1	Column 2	Column 3	Column 4	Column 4a	Column 5	Column 6	Column 7
Liquid Effluents							
Maximum dose to total body from all pathways (mrem/yr)	2.4E-01	2.5E-01	4.71E-01	2.94E-01	3.36E-01	1.50E-02	3 per unit
Maximum dose to any organ from all pathways (mrem/yr)	2.8E+00	2.9E+00	7.34E+00	1.66E+00	1.89E+00	3.70E-02	10 per unit
Gaseous Effluents							
Gamma dose in air from noble gases (mrad/yr)	7.2E-01	7.6E-01	8.54E-01	8.18E-01	9.34E-01	1.82E-01	10 per unit
Beta dose in air from noble gases (mrad/yr)	9.2E-01	9.7E-01	7.32E-01	4.63E-01	5.30E-01	1.25E-01	20 per unit
Maximum dose to total body of an individual (mrem/yr)	4.8E-01	5.0E-01	5.76E-01	5.45E-01	6.23E-01	3.47E-01	5 per unit
Maximum dose to skin of an individual (mrem/yr)	1.0E+00	1.1E+00	1.16E+00	9.73E-01	1.11E+00	4.73E-01	15 per unit
Maximum dose to any organ from all pathways from radioiodines and particulates (mrem/yr)	5.4E+00	5.7E+00	1.25E+01	8.50E+00	9.72E+00	1.78E+00	15 per unit
Calculation Methodology							
Source Term	Pre-Release Version of GALE	Pre-Release Version of GALE	ANSI/ANS-18.1-1999	ANSI/ANS-18.1-1999	N/A		
Liquid Effluent Analysis	Pre-Release Version of LADTAP	NRC Dose 2.3.16 - LADTAP (2010)	NRC Dose 2.3.16 - LADTAP (2010)	NRC Dose 2.3.16 - LADTAP (2010)			
Gaseous Effluent Analysis	Pre-Release Version of GASPAR	NRC Dose 2.3.16 - GASPAR (2010)	NRC Dose 2.3.16 - GASPAR (2010)	NRC Dose 2.3.16 - GASPAR (2010)			
Dose Conversion Factor and Methodology	Pre-Release Version of RG 1.109	RG 1.109, Rev. 1 (1977)	RG 1.109, Rev. 1 (1977)	RG 1.109, Rev. 1 (1977)			
Additional Information	Column 2 was multiplied by 1.05 (conservative previous Power Rerate multiplier) to generate the values in Column 3.	N/A	The source term in Column 5 was multiplied by 3528/4030 to generate the source term to calculate the values in Column 4a. Comparing the doses calculated in Column 4a to the doses calculated in Column 5 validates the conservatism of the previous methodology used in Column 2 and Column 3 (i.e., the resulting doses in Column 4a were decreased by a factor of 3528/4030, thus a straight power factor can be applied when calculating EPU gaseous and liquid effluent doses).				