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PROPRIETARY INFORMATION – WITHHOLD UNDER 10 CFR 2.390

10 CFR 50.90
10 CFR 2.390

January 17, 2014

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 17 Response to Request for Additional Information, Corrections and Clarifications – 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 7 Response to Request for Additional Information," dated July 31, 2013 (ADAMS Accession No. ML13213A285)

3. Letter from K. F. Borton (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "Extended Power Uprate License Amendment request – Supplement 13 Response to Request for Additional Information," dated October 15, 2013 (ADAMS Accession No. ML13221A064)

4. Letter from K. F. Borton (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "Extended Power Uprate License Amendment request – Supplement 11 Response to Request for Additional Information," dated September 13, 2013 (ADAMS Accession No. ML13289A300)

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Attachment 1 contains Proprietary Information.
When separated from Attachment 1, this document is decontrolled.

In accordance with 10 CFR 50.90, Exelon Generation Company, LLC (EGC) requested amendments to 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.

The attachments to this letter provide responses to follow-up questions from the Containment and Ventilation Branch (SCVB) and the Health Physics and Human Performance Branch (AHPB) review of Reference 1, corrections to the EGC's response to AHPB-HP-RAI-4, a revision to Enclosure 9e (Condensate Storage Tank Modifications) to Reference 1, and a corrected Technical Specifications page markup.

GE Hitachi Nuclear Energy America (GEH) considers portions of the information provided in the responses in Attachment 1 to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. The proprietary information in Attachment 1 is identified; a non-proprietary version of the responses is provided in Attachment 2. In accordance with 10 CFR 2.390, EGC requests Attachment 1 be withheld from public disclosure. An affidavit supporting this request for withholding is included as Attachment 7.

The attachments to this supplement are summarized as follows:

Attachment 1 provides additional information related to responses that EGC submitted to SCVB RAIs in Reference 2.

Attachment 2 provides a non-proprietary version of Attachment 1.

Attachment 3 provides revised responses to AHPB-HP-RAIs 1 and 2 regarding calculated projected doses to operators performing actions in vital areas that EGC originally submitted in Reference 3.

Attachment 4 corrects errors to the response to AHPB-HP-RAI-4 regarding offsite doses originally submitted in Reference 4.

Attachment 5 revises Enclosure 9e to Reference 1 to include the bounding Condensate Storage Tank and Refueling Water Storage Tank volume requirements for an Appendix R event affecting both units.

Attachment 6 provides corrected Technical Specifications markup pages.

Attachment 7 provides an affidavit in support of withholding proprietary information contained in Attachment 1.

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.

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 17th day of January 2014.

Respectfully,

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

Attachments:
1. Response to Request for Additional Information – SCVB – PROPRIETARY
2. Response to Request for Additional Information – SCVB
3. Revised Responses to AHPB-HP-RAIs 1 and-2
4. Revised Response to AHPB-HP-RAI-4
5. Revised Enclosure 9e (CST Modifications) to EPU LAR
6. Correction to Technical Specifications Pages Submitted in Supplement 16
7. Affidavit In Support of Request to Withhold Information

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/o proprietary attachment
	S. T. Gray, State of Maryland	w/o proprietary attachment

Attachment 7

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

AFFIDAVIT

Note

Attachment 1 contains proprietary information as defined by 10 CFR 2.390. GEH, as the owner of the proprietary information, has executed the enclosed affidavit, which identifies that the proprietary information has been handled and classified as proprietary, is customarily held in confidence, and has been withheld from public disclosure. The proprietary information has been faithfully reproduced in the attachment such that the affidavit remains applicable.

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, Peter M. Yandow, state as follows:

(1) I am the Vice President, Nuclear Plant Projects/Services Licensing, Regulatory Affairs, of GE-Hitachi Nuclear Energy Americas LLC ("GEH"), and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 1 of GEH letter, GEH-PBAPS-EPU-432, "PBAPS EPU: GEH Responses to SCVB RAIs 31, 32, & 33," dated January 14, 2014. The GEH proprietary information in Enclosure 1, which is entitled "Responses to SCVB RAIs 31, 32, & 33," is identified by a dotted underline inside double square brackets. [[This sentence is an example.{3}]] In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the *Freedom of Information Act* ("FOIA"), 5 U.S.C. Sec. 552(b)(4), and the *Trade Secrets Act*, 18 U.S.C. Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for trade secrets (Exemption 4). The material for which exemption from disclosure is here sought also qualifies under the narrower definition of trade secret, within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975 F.2d 871 (D.C. Cir. 1992), and Public Citizen Health Research Group v. FDA, 704 F.2d 1280 (D.C. Cir. 1983).

(4) The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. Some examples of categories of information that fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without license from GEH constitutes a competitive economic advantage over other companies;

b. Information that, if used by a competitor, would reduce their expenditure of resources or improve their competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information that reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;

d. Information that discloses trade secret or potentially patentable subject matter for which it may be desirable to obtain patent protection.

(5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GEH,

and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, not been disclosed publicly, and not been made available in public sources. All disclosures to third parties, including any required transmittals to the NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary or confidentiality agreements that provide for maintaining the information in confidence. The initial designation of this information as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in the following paragraphs (6) and (7).

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, who is the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or who is the person most likely to be subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited to a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist, or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary or confidentiality agreements.

(8) The information identified in paragraph (2), above, is classified as proprietary because it contains the detailed GEH methodology for pressure-temperature curve analysis for the GEH Boiling Water Reactor (BWR). These methods, techniques, and data along with their application to the design, modification, and analyses associated with the BWR containment and ventilation systems were achieved at a significant cost to GEH.

The development of the evaluation processes along with the interpretation and application of the analytical results is derived from the extensive experience databases that constitute a major GEH asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH. The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial. GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 14th day of January 2014.

Peter M. Yandow
Vice President, Nuclear Plant Projects/Services
Licensing, Regulatory Affairs
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Attachment 2

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Response to Request for Additional Information – SCVB

Response to Request for Additional Information

Containment and Ventilation Branch (SCVB)

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.

The NRC reviewed the information supporting the proposed amendment and by letter dated July 1, 2013, (ADAMS Accession No. ML13178A331), the SCVB requested additional information. EGC provided responses in Supplement 7 to the EPU LAR by letter dated July 31, 2013 (ADAMS Accession No. ML13213A285. In an email from Mr. Rick Ennis of NRC to Mr. Kevin Borton of EGC dated November 15, 2013, the NRC staff requested that EGC provide responses to the following requests for additional information. During a conference call on December 19, 2013, Mr. David Neff of EGC agreed that responses would be provided by January 20, 2014. The responses to those requests are provided below.

SCVB-RAI-31

Reference: Exelon's Supplement 7 dated July 31, 2013, Attachment 1, response to request for additional information (RAI) SCVB-RAI-2, Power Uprate Safety Analysis Report (PUSAR[1]) Section 2.6.3.1.2, and PUSAR Table 2.6-1.

With respect to the parameter "Initial containment temperature" in the table on page 5 of Attachment 1 to Supplement 7, please provide further explanation of why it is conservative to use 125 °F as the initial drywell gas temperature (for evaluation of equipment qualification) instead of using the current analysis value of 145 °F. Provide the resulting drywell gas temperature profiles for the two cases with initial drywell temperatures of (a) 125 °F and (b) 145 °F, while using the values of the remaining parameters and assumptions the same as in the EPU analysis.

RESPONSE

It is conservative to use 125°F as the initial drywell gas temperature instead of 145°F because it leads to a higher peak drywell temperature in the analysis used for equipment qualification evaluation. A lower initial drywell gas temperature in the analysis results in [[ ]]. The difference in [[ ]] leads to a higher pressure and accordingly higher peak temperature for the extended power uprate (EPU) limiting drywell temperature analysis with break flow area of 0.25 ft^2.

Figure 31-1 presents drywell gas temperature profiles for the EPU limiting drywell temperature analysis (break flow area of 0.25 ft^2) case performed with an initial drywell temperature of 125°F

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[1] A proprietary (i.e., non-publicly available) version of the PUSAR is contained in Attachment 6 to the application dated September 28, 2012. A non-proprietary (i.e., publicly available) version of the PUSAR is contained in Attachment 4 to the application dated September 28, 2012.

and a case performed with an initial drywell temperature of 145°F. Both cases are performed with the same parameters and assumptions as the EPU analysis with the exception of the initial drywell temperature.

The results in Figure 31-1 show that the peak drywell gas temperature in the case with initial drywell temperature of 125°F is [[ ]], which is slightly higher [[ ]] than the case with initial drywell temperature of 145°F and peak temperature of [[ ]].

[[

]]

Figure 31-1. Initial Drywell Temperature Sensitivity Results (Limiting Drywell Temperature Analysis)

SCVB-RAI-32

With respect to PUSAR Section 2.6.5.1, please provide the following:

a) For a small steam line break (SSLB) loss-of-coolant accident (LOCA), provide the peak suppression pool temperature in the non-accident unit in the dual unit interaction analysis.

b) For a loss of residual heat removal (RHR) normal shutdown cooling (NSDC) event, provide the peak suppression pool temperature in the NSDC unit in the dual unit interaction analysis.

RESPONSE

Rather than performing an analysis for each transient scenario, the non-accident unit shutdown was modeled based on a combination of the most conservative inputs and assumptions relevant to that unit, and conservatively considering the impact of the dual-unit interaction originated from the accident unit on the response of the non-accident unit. This is discussed on Page 2-274 of the PUSAR (Section 2.6.5.1), and is also explained in the response to RAI 9 in Supplement 7 (ADAMS Accession No. ML13213A285). For example, the safe shutdown of the non-accident unit considers the RHR cross-tie mode unavailable. However, there is adequate onsite emergency AC electrical power to maintain the RHR cross-tie mode available for torus cooling for the SSLB and loss of NSDC events. Therefore, it is conservative to assume the cross-tie is unavailable as was assumed in the non-accident unit safe shutdown analysis. In addition, the interruption of suppression pool cooling (SPC) due to the dual unit interaction effect (i.e., of a delayed LOCA signal that could occur during the accident unit scenario) was conservatively modeled to occur just before the peak pool temperature in the non-accident unit (discussed in PUSAR Section 2.6.5.1). The LOCA signal for a design basis accident (DBA) LOCA in the accident unit would occur immediately and have no impact on the non-accident unit. These input assumptions assure that the current analysis for the non-accident unit shutdown remains bounding and is independent of the events for the accident unit. Table 32-1 shows the detailed comparisons between the current non-accident unit analysis presented in PUSAR and the non-accident unit shutdown analyses for each accident scenario.

Therefore, the peak suppression pool temperatures for all three scenarios in Table 32-1, including the two events requested, are bounded by the temperature reported in PUSAR Section 2.6.5.1 and Table 2.6-5 (i.e., 203.8°F)

Table 32-1. Assumptions for Non-Accident Unit Analysis Compared to the Requirements and/or Component Availability for the Different Events in Accident Unit

	Analysis Assumptions for Non-Accident Unit for All Scenarios in PUSAR	Non-Accident Unit with **DBA-LOCA** in Accident Unit	Non-Accident Unit with **SSLB** in Accident Unit	Non-Accident Unit with **Loss of NSDC** in Accident Unit
Technical Specification Min/Max Inputs	Utilized as required for all events	Required	Required	Required
Dual Unit Interaction (interaction from the accident unit)	Utilized conservatively to bound all events	Not Required*	Required	Required
Torus Cooling	Utilized Single RHR Heat Exchanger (Hx) conservatively to bound all events	Single RHR Hx Available	RHR Cross-tie Mode Available	RHR Cross-tie Mode Available

* The DBA LOCA signal occurs immediately, before SPC is established in the non-accident unit. Therefore there is no impact on suppression pool temperature.

SCVB-RAI-33

PUSAR page 2-277, under the heading "Pool Temperature Response - Small Steam Break LOCA," states the following in the second paragraph:

> Reactor vessel inventory makeup is provided by one loop of CS [core spray] (two pumps) and three RHR pumps in LPCI [low pressure coolant injection] mode.

The above statement appears to contradict the response to SCVB-RAI-13 on page 25 of Attachment 1 to Supplement 7 dated July 31, 2013, which states:

> Although there is no LOCA signal early in the SSLB event, the analysis assumed that all available ECCS [emergency core cooling system] pumps start with minimum delay (approximately 15 seconds) non-mechanistically. This is a conservative assumption since assumed early operation of the ECCS pumps adds more heat to the containment. Although the RHR pumps start in LPCI mode, no actual LPCI injection occurs during the first 10 minutes since the RPV [reactor pressure vessel] pressure is still higher than the pump head. At 10 minutes, 2 RHR pumps are secured. The remaining RHR pump is run in SPC [suppression pool cooling] mode and Wetwell Spray mode. When the Wetwell pressure reaches 9 psig, operators switch RHR from SPC mode and Wetwell Spray mode to Drywell Spray mode and Wetwell Spray mode.

Please clarify or correct.

RESPONSE

The assumptions in the PUSAR page 2-277 under the heading small steam break loss-of-coolant accident (LOCA) and RAI-13 Part (a) are consistent with each other.

For a small steam line break, two CS pumps in one CS loop and three RHR pumps in LPCI mode are assumed to start. This is the same assumption both in PUSAR page 2-277 second paragraph under the small steam break LOCA heading and the SCVB-RAI-13 Part (a) response. Note that although two CS pumps and three LPCI pumps start with a short delay, the actual amount of injection from these low pressure injection systems depends on the vessel pressure. The RPV pressure is initially too high for low pressure ECCS pumps to deliver any water to the vessel as discussed in the SCVB-RAI-13 response. The only effect of these pumps running is adding pump heat to the system.

Paragraph 3 of the same section in PUSAR states that at 10 minutes, operators turn off two RHR pumps and aligns the remaining RHR pump to containment cooling. Therefore, there is only one loop of CS (two pumps) left for injection to vessel after 10 minutes. This is also the same assumption stated in the SCVB-RAI-13 Part (a) response.

SCVB-RAI-34

Reference: Exelon's Supplement 7 dated July 31, 2013, Attachment 1, response to RAI SCVB-RAI-1.

With respect to the parameter "Initial reactor pressure" in the table on page 2 of Attachment 1 to Supplement 7, the justification in the last column of the table does not seem to be related to this parameter. Please correct or provide additional explanation.

RESPONSE

The justification text is a result of an administrative error. The text should refer to 'initial reactor pressure' rather than 'initial containment temperature'.

Attachment 3

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Revised Responses to AHPB-HP-RAI's 1 and 2

Revised Responses to Requests for Additional Information
Health Physics and Human Performance Branch

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.

The NRC reviewed the information supporting the proposed amendment and by letter dated August 15, 2013, (ADAMS Accession No. ML13221A064), the AHPB requested additional information. EGC provided responses in Supplement 13 to the EPU LAR by letter dated October 15, 2013 (ADAMS Accession No. ML13289A300). In an email from Mr. Rick Ennis of NRC to Mr. Kevin Borton of EGC dated October 24, 2013, the NRC staff provided follow-up questions seeking clarification to the response to AHPB-HP-RAIs 1 and 2 in Supplement 13. A conference call was conducted on December 23, 2013 and Mr. Kevin Borton of EGC agreed to submit a revision to the responses to AHPB-HP-RAIs 1 and 2 to resolve the follow-up questions. The revised responses to these requests are provided below and supersede the previous responses.

AHPB-HP-RAI-1

Power Uprate Safety Analysis Report (PUSAR[1]) page 2-512 states, in part, that post-accident vital area access per NUREG-0737, Item II.B.2, mission doses were evaluated in the analyses that support the NRC safety evaluation (SE) for implementation of the Alternative Source Term (AST) license amendment, and that the TID-14844 was retained for these doses. However, the referenced amendment and SE only addressed the control room, not the other vital areas in the plant. In addition, the re-calculated doses for the control room were based on the AST source term. Resolve this apparent discrepancy. Provide a clear description of the technical basis for calculating the II.B.2 mission doses.

RESPONSE

PBAPS Mission Dose Background

The PBAPS post-LOCA vital area mission doses were originally calculated at 3,440 MW_t as part of the post-TMI action plan. The original results were reported via the PBAPS response to unresolved items 277/82-23-01 and 278/82-22-01 from inspection reports 50-277/82-23 and 50-278/82-22 (Reference 1).

The EPU calculations are based on Reference 1 and add the radiation sources described by PUSAR Section 2.9.1.1 and the LOCA assumptions described by PUSAR Section 2.9.2. As such, the EPU calculations include the post-TMI Reference 1 information and the following inputs:

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[1] A proprietary (i.e., non-publicly available) version of the PUSAR is contained in Attachment 6 to the application dated September 28, 2012. A non-proprietary (i.e., publicly available) version of the PUSAR is contained in Attachment 4 to the application dated September 28, 2012.

- All AST (Reference 2) changes,
- The proposed EPU power increase (1.02 x EPU = 4,030 MW_t),
- The proposed EPU reduction in Tech Spec allowed MSIV leakage,
- A change to Cline elemental iodine removal efficiencies,
- Station physical layout changes since 1983, and
- Current plant procedures.

EPU Mission Dose Methodology

Four post-LOCA radiation sources are evaluated by the EPU mission dose calculations:

1. Direct shine from secondary containment - applied to transit and occupancy,
2. Direct shine from radioactive equipment and piping - applied to transit and occupancy,
3. Airborne submergence outside buildings - applied to transit, and
4. Airborne submergence inside buildings - applied to transit and occupancy.

Reference 1 computed the original secondary containment activity levels, and the corresponding direct shine dose rates, per Regulatory Guide 1.3. The EPU evaluation scaled the containment dose rates for core thermal power (4,030 / 3,440 = 1.172), and for increased containment leakage (0.7 / 0.5 = 1.4) as licensed in the prior AST submittal (Reference 2).

Similarly, Reference 1 computed radioactive equipment activity levels, and the corresponding direct shine dose rates, per Regulatory Guide 1.3. The EPU evaluation scaled the equipment dose rates for core thermal power (4,030 / 3,440 = 1.172).

Several EPU-related changes dominate the indoor and outdoor airborne submergence dose rates. The EPU core inventory acts to increase submergence dose rates, while the reduction in MSIV leakage and use of Cline elemental iodine removal efficiencies act to reduce submergence dose rates. Because these changes interact in a complex manner, the indoor and outdoor airborne submergence dose rates are re-computed using the Regulatory Guide 1.183 methodology.

The submergence calculations apply the site-specific RADTRAD model originally developed for, and described by, the Reference 2 AST submittal. This model is the same model that was used for the PUSAR Section 2.9.2 post-accident radiological consequences evaluation.

EPU considers three components to the airborne submergence dose rate calculations:

1. MSIV leakage,
2. Containment leakage, and
3. ESF leakage.

For the infrequent occupancy missions, the evaluated missions are all round trips. For the continuous occupancy missions, the evaluated missions are one-way trips because the return trips occur after the analyzed 30-day post-LOCA period.

AHPB-HP-RAI-2

PUSAR page 2-512, 5th paragraph, concludes that "all of the doses are within the limits of GDC 19," with respect to vital area access. However, Table 2.9-11, "Post-LOCA Vital Areas Requiring Infrequent Occupancies," indicates several vital area mission doses that exceed the 5 rem GDC 19 acceptance criteria. Provide a list of all the vital areas (per the definition in II.B.2), the calculated mission dose to operators performing the vital action in these areas in post-accident radiological conditions, and a description of the calculational method used to obtain the dose values.

RESPONSE

Introduction

After further examination, it was determined that the originally submitted PUSAR Table 2.9-11 did not support conformance to GDC-19 for three missions, both at CLTP and EPU. EGC re-evaluated these missions for both CLTP and EPU. These errors were entered into the EGC corrective action program.

The definition of the post–accident vital areas from NUREG-0737, Item II.B.2, was reviewed and the PBAPS specific vital areas, missions, activity durations and transit pathways were updated to reflect the current station physical layout. All missions to infrequently occupied vital areas are now calculated as round-trips. A correction is also made to the total dose calculated for the mission from the Main Access Facility (MAF) to the Control Room (CR).

Part 1 – List of all the vital areas (per the definition in II.B.2)

The current list of vital areas for PBAPS is provided in Table 2-1. The areas listed are also indicated in the revised PUSAR Tables 2.9-10 and 2.9-11 in Enclosure A to this Attachment (Inserts B and C).

Table 2-1 PBAPS Post-Accident Vital Areas

NUREG-0737 Item II.B.2 Vital Area	Required Occupancy	Location
Control Room (CR)	Continuous	Turbine Building (TB) El-165'
Technical Support Center (TSC)	Continuous	Training Center 3rd Floor
Refueling Floor	Infrequent	Reactor Building (RB) El-234'
TB Ventilation Equipment Area	Infrequent	Turbine Building El-195'
Diesel Generator Building	Infrequent	Diesel Generator Building
Radwaste Control Room	Infrequent	Radwaste Building (RWB) El-135'

NUREG-0737 Item II.B.2 Vital Area	Required Occupancy	Location
Chemistry Lab / Counting Room	Infrequent	Plant Entrance and Radiochemistry Laboratory (PEARL) Building 2nd Floor
Main Access Facility (MAF)	Infrequent	Main Access Facility previously called Guardhouse
Cable Spreading Room	Infrequent	Turbine Building El-150'
Operations Support Center (OSC)	Infrequent	Administrative Building 2nd Floor

Part 2 – Calculated mission dose to operators performing the vital actions

The NUREG-0737, Item II.B.2 calculated mission doses to operators performing vital actions in post-accident radiological conditions are revised to address the current vital areas, missions, activity durations and transit pathways. All mission doses meet the GDC-19 criteria. These results are provided in revisions to PUSAR Tables 2.9-10 and 2.9-11 in Enclosure A to this Attachment (Inserts B and C). PUSAR text associated with the tables is also updated in the enclosure (Inserts A and D). The information in the enclosure supersedes that provided in the EPU LAR submittal and in Supplement 13 to the EPU LAR. Changes to the PUSAR tables are discussed below.

PUSAR Table 2.9-10 Changes

The backup counting room is deleted from this table because it is no longer a vital area requiring continuous occupancy and, per the current plant Emergency Plan (Reference 3), it does not require any actions to be performed in that location.

PUSAR Table 2.9-11 Changes

The revision to PUSAR Table 2.9-11 is provided in insert C in Enclosure A to this Attachment. This revision is updated to explicitly describe the missions, the start times, the total mission duration times, and the total mission dose. Mission-specific notes are also shown and these notes append mission-specific details to the EPU mission dose methodology.

The M-G set room is no longer considered a vital area following the elimination of the post-accident sampling system in 2003 as detailed in Reference 5.

The post-LOCA Hydrogen Control vital area mission is no longer required. This change to the post-accident mitigation procedures was accepted by the NRC as part of the license amendment (Reference 4) to delete PBAPS Technical Specifications (TS) section 3.6.3.1, "Containment Atmospheric Dilution (CAD) System." Therefore, this mission is no longer evaluated and the OSC to CAD mission is deleted.

EPU Mission Dose Conclusions

A review of the doses associated with access to vital areas was conducted to determine the effect of EPU. The times required for transit and work in vital access areas are updated to reflect the current station physical layout and procedures. The proposed TS allowable MSIV leakage reduction significantly reduces submergence dose rates, and for some missions, the leakage reduction dominates the EPU power increase, yielding a net mission dose decrease. For EPU, all mission doses meet the NUREG-0737, Item II.B.2, requirements.

Part 3 – Description of the calculational method for mission doses

The methodology for calculating the mission doses is described in the response to AHPB-HP-RAI-1.

REFERENCES:

1. Letter from Shields L. Daltroff (Philadelphia Electric Company) to Richard W. Starostecki (NRC), Peach Bottom Atomic Power Station Response to Unresolved Items (277/82-23-01; 278/82-22-01), May 13, 1983

2. NRC letter, "Issuance of License Amendments RE: Application of Alternative Source Term Methodology", dated September 5, 2008. (PBAPS License Amendment Nos. 269 (Unit 2) and 273 (Unit 3)) (NRC Accession No. ML082320406)

3. EP-AA-1007, Radiological Emergency Plan Annex for Peach Bottom Atomic Power Station, Revision 28

4. NRC letter "Issuance of License Amendments to Incorporate TSTF-478, Revision 2, "BWR Technical Specifications Changes that Implement the Revised Rule for Combustible Gas Control"," dated January 28, 2010. (PBAPS License Amendment Nos. 274 (Unit 2) and 278 (Unit 3)) (NRC Accession No. ML100130814)

5. NRC letter, "Issuance of Amendment Re: Elimination of Requirements for Post Accident Sampling System", dated May 22, 2003. (PBAPS License Amendments Nos. 248 (Unit 2) and 251 (Unit 3)) (NRC Accession No. ML030980491)

Enclosure A to Attachment 3

<u>Mark-up of PUSAR Pages Regarding Mission Dose</u>

(Affected pages include 2-495, 2-505, 2-506 and 2-512) spike) and a value of 0.2 μCi/gm Dose Equivalent I-131 equilibrium iodine activity for continued full power operation.

The EPU post-accident doses for the MSLBA were determined to be within the applicable regulatory limits. The results and regulatory criteria are summarized in Tables 2.9-8 and 2.9-9.

Post-LOCA Vital Area Mission Doses

An additional review of the doses associated with access to vital areas was conducted to determine the effect of EPU. The times required for transit to and work in vital areas are not changed with EPU.

Vital areas are defined in NUREG-0737, Item II.B.2, as those "which will or may require occupancy to permit an operator to aid in the mitigation of or recovery from an accident." Compliance to NUREG-0737, Item II.B.2, assures the shielding adequacy necessary to reduce the whole body (WB) dose (i.e., external dose) to an operator to perform the vital function in a given mission time to less than the allowable limit of 5 rem whole body dose.

Post-LOCA Vital Areas Requiring Continuous Occupancies

Control Room

The post-LOCA CR dose contributions from various radioactive sources are analyzed and listed in Table 2.9-5.

Technical Support Center (TSC)

Insert A

The post-LOCA TSC dose contributions from various radioactive sources are analyzed and listed ~~in Table 2.9-10.~~

~~Backup Counting Room (BCR)~~

~~Because the BCR and TSC are located in the same building at the different elevations, the post-LOCA TSC doses are conservatively applied to the BCR and listed in Table 2.9-10.~~

~~**Post-LOCA Vital Areas Requiring Infrequent Occupancies**~~

~~The vital areas requiring infrequent occupancies to perform the required vital functions are listed in Table 2.9-11, including the resulting doses. The radiation exposures to vital areas are calculated using the occupancy times determined based on the time-motion studies performed for the plant operating license. Projected WB doses for areas within Turbine Hall / Radwaste Building Complex, Operations Support Center (OSC) to CAD Building and TSC to refueling floor (EL-234') to exchange the radioactive effluent monitor cartridge (1 hour after a LOCA) and to maintain the spent fuel water level are expected to exceed the allowable dose limit of 5 rem because the CAD Building and reactor building refueling floor is not accessible during the early phase of the accident. The applicable plant procedures take complete control of the radiation exposure during vital functions by providing the RP coverage to perform radiation surveys, and determining occupancy and radiation protection requirements before the vital functions are performed to maintain the resulting WB exposure to ALARA and within the guideline value.~~

Table 2.9-8 MSLBA Pre-Incident Iodine Spike Radiological Consequences

	TEDE Dose (REM)		
	Receptor Location		
	CR	EAB	LPZ
Calculated Dose CLTP	3.23	1.97	0.28
Calculated Dose EPU	2.10	5.43	0.82
Allowable TEDE Limit	5.0	25	25

Table 2.9-9 MSLBA Equilibrium Iodine Concentration Radiological Consequences

	TEDE Dose (REM)		
	Receptor Location		
	CR	EAB	LPZ
Calculated Dose CLTP	0.16	0.10	0.01
Calculated Dose EPU	0.11	0.27	0.04
Allowable TEDE Limit	5.0	2.5	2.5

Insert B

Table 2.9-10 Post-LOCA Vital Areas Requiring Continuous Occupancies

Areas Requiring Continuous Occupancy	30-Day Dose (rem TEDE)	
	CLTP	EPU
Control Room	4.69	4.80
Technical Support Center	3.76	3.77
Backup Counting Room	3.76	3.77

Insert C

Table 2.9-11 Post-LOCA Vital Areas Requiring Infrequent Occupancies

Access Route	Time After Accident (hr)	Projected Total Whole Body Dose	
		CLTP (rem)	EPU (rem)
Guard House to TSC & Backup Counting Room	8	0.214	0.245
Guard House to Control Room (EL 165')	8	0.860	0.798
Within Turbine Hall / Radwaste Building Complex (HP-OSC, OSC, Chem Lab / Counting Room, M-G Set Room, Radwaste Control Room, and Cable Spreading Room)	8	1.639	1.304**
OSC to Diesel Generator Building	24	0.818	0.868
OSC to CAD Building*	24	5.328	6.044
TSC to Refueling Floor (EL 234') – Cartridge Exchange at Rad Effluent Monitor*	1	5.491	6.027
TSC to Refueling Floor (EL 234') – Makeup Water to Spent Fuel Pool*	2	5.937	6.531

* Projected whole body (WB) doses for OSC to CAD Building and TSC to refueling floor (EL-234') to exchange the radioactive effluent monitor cartridge (1 hour after a LOCA) and to maintain the spent fuel water level exceeded the allowable dose limit of 5 rem because the CAD Building and reactor building refueling floor is not accessible during the early phase of the accident.

** The airborne WB doses in all vital access areas are reduced due to the reduced MSIV leakage modeled in the EPU dose analysis. The MSIV leakage related decrease is more than the EPU related increase, resulting in a net reduction in the airborne submergence WB dose. The 8-hour airborne average dose in the subject vital area is at least 2 orders of magnitude higher than secondary shine dose. Therefore, the reduction in the airborne WB dose resulted in a reduced total WB dose in the compartment.

The existing radiation protection design (e.g., the maximum designed dose rates for each area of the plant) for areas outside the N-16 affected areas will not change as a result of the increased dose rates associated with EPU. A review was performed for areas expected to be affected by the increased dose rates as a result of EPU. Based on this review, it was concluded that no changes in the shielding requirements will need to be made as a result of EPU. N-16 dose rates may increase by no more than 30%. Steam containing components such as the turbine and condenser are heavily shielded as shown in radiation zone maps, and based on survey data, dose rate increases due to EPU will remain within acceptable zone designations with the current shielding designs.

PBAPS has the following options if necessary for the increased dose rates due to EPU.

1. Use of operational radiation survey data to establish available calculation method related margins.
2. Re-posting and locking areas, as needed, in accordance with 10 CFR 20 requirements and PBAPS policy.
3. Using additional permanent and/or temporary shielding where needed and feasible.
4. Operation of equipment in a manner that compensates for these relatively minor source increases.

Insert D

In summary, individual worker exposures can be maintained within acceptable limits by controlling access to radiation areas using the site ALARA program. Procedural controls ~~compensate for increased radiation levels.~~

~~The effect of EPU on access to plant vital areas following an accident (Item II.b.2 of NUREG-0737) was evaluated in the analyses that support the NRC Safety Evaluation for implementation of the Alternative Source Term. The evaluation determined that the existing OLTP analyses, which are based on TID-14844 (Reference 84) rather than the Alternative Source Term, are conservative and bounding.~~

~~An additional review of the doses associated with access to vital areas was conducted to determine the effect of EPU. The times required for transit to and work in vital access areas are not changed with EPU. The operator doses are expected to increase by up to 20% compared to OLTP. After evaluating this increase, it was concluded that all of the doses are within the limits of GDC-19.~~

In summary, analyses and measurements have confirmed that operation under EPU conditions will have a negligible effect on occupational and onsite radiation exposure. Therefore, occupational and onsite radiation exposure meets all CLTR dispositions.

A review was performed of the historical radiation zone maps, which have been historically acceptable, and recent radiation dose surveys to identify areas where the doses resulting from EPU could affect current radiation protection practices. Based on this review and post-EPU surveys, radiation zoning will be updated as necessary. Plant area locations where post-EPU radiation surveys are performed can be found in Section 2.12.1.

Inserts associated with Mark-ups of PUSAR Pages Regarding Mission Dose

Insert A:

Post-LOCA Vital Areas Requiring Infrequent Occupancies

The mission doses to access, occupy, and return from, the infrequently occupied areas are shown in Table 2.9-11. The radiation exposures are calculated using the mission and occupancy times from plant-specific time-motion studies. EPU re-evaluates all missions using AST, considering the increase in core power, the MSIV leakage limit reduction, application of Cline elemental iodine removal efficiencies, and the current station physical layout and procedures. All vital areas requiring occupancy remain accessible post-EPU for the required missions.

Insert B:

Table 2.9-10 Post-LOCA Vital Areas Requiring Continuous Occupancy

Areas Requiring Continuous Occupancy	30-Day Dose (rem TEDE)	
	CLTP	EPU
Control Room	4.69	4.80
Technical Support Center	3.76	3.77

Insert C:

Table 2.9-11
EPU Post-LOCA Projected Doses to Individuals Accessing the Vital Areas Requiring Either Continuous or Infrequent Occupancy

Description	Start Time after LOCA (hr)	Total Duration (min)	Total Dose (rem)	Note
From TSC to the RB Refueling Floor - Provide Makeup Water to Spent Fuel Pools	12	91	4.363	1
From TSC to the TB Ventilation Equipment Area - Cartridge Exchange at Radiation Effluent Monitor	1	70	4.428	2

Description	Start Time after LOCA (hr)	Total Duration (min)	Total Dose (rem)	Note
From OSC to the Diesel Generator Building - Monitor Emergency Power Supply Operation	24	46	0.868	3
From CR to the Radwaste Control Room - Manipulate Radwaste Controls	8	500	1.333	4
From CR to the Cable Spreading Room - Various Postulated Actions to Support Post-LOCA Recovery	8	500	1.333	4
From CR to OSC - Personnel Support	8	500	1.333	4 & 5
From CR to Chemistry Lab / Counting Room - Sampling Analysis	8	500	1.333	4 & 6
From MAF to TSC - Access from Offsite	8	10	0.245	7
From MAF to CR - Access from Offsite	8	16	0.817	8

Note 1
The mission start time is changed from the post-TMI action plan value. This change is supported by current procedures which initiate the mission later than 12 hrs after the LOCA.

The EPU calculations show that earlier start times can produce higher mission doses because the shine and submergence dose rates are decreasing beyond 12 hrs; therefore, 12 hrs is selected to produce a conservatively high mission dose.

Some EPU segment durations are changed from the post-TMI action plan values. All EPU dose calculations apply segment durations that are conservatively longer than the segment durations determined by the most recent time-motion study.

Note 2
After the post-TMI action plan, the cartridge locations were moved from the RB refueling floors to the TB Ventilation Equipment Area. Consequently, some EPU mission segments are changed from those described by the post-TMI action plan. All EPU dose calculations apply segment durations that are conservatively longer than the segment durations determined by the most recent time-motion study.

Note 3
After the post-TMI action plan, the OSC was moved from the TB to the Admin Building. This relocation reduces the mission travel time, which significantly reduces shine and submergence dose. For conservatism, EPU retains the post-TMI action plan mission origin and timing.

Note 4
Consistent with the post-TMI action plan, this mission is analyzed at the time of maximum submersion dose rate following the LOCA.

Rather than analyze this exact mission, EPU retains the post-TMI action plan bounding generic mission. This simplification allows a single calculation to bound multiple vital area missions. This treatment was established by the post-TMI action plan and remains valid for EPU.

The generic mission conservatively assumes a 10 min travel time for access and egress, which is longer than most time-consuming trip between vital areas within the TB/RWB complex. Similarly, the generic mission conservatively assumes a bounding mission stay time of 8 hrs.

Note 5
When the post-TMI action plan was submitted, the OSC was located in the TB/RWB complex. The OSC was subsequently moved to the Admin Building. For conservatism, EPU retains the post-TMI action plan mission origin and timing. This treatment is acceptable because the Admin Building is further from secondary containment, and the shine dose rate during the 8 hr occupancy is significantly lower than the TB/RWB shine dose rate used by the calculation.

The OSC move increases the travel dose because of the exterior travel between the TB and the Admin Building. However, the distance between the buildings is small, and the increase in travel dose is less than the increase in occupancy dose from assuming that the OSC remains within the TB.

For conservatism, EPU retains the post-TMI action plan mission origin and timing.

Note 6
When the post-TMI action plan was submitted, the Chemistry Lab / Counting Room was located in the TB. The Chemistry Lab / Counting Room was subsequently moved to the PEARL building which is immediately adjacent to the TB. EPU prepared a RADTRAD model of the new Chemistry Lab / Counting Room and found that the submergence dose rates for the new location are an order of magnitude lower than for the old location. For conservatism, EPU retains the post-TMI action plan mission origin and timing.

While the new location is further from the control room than the old location, the additional travel time is small relative to the long occupancy time, and the increase in travel dose is less than the increase in occupancy dose from assuming that the Chemistry Lab / Counting Room is within the TB.

For conservatism, EPU retains the post-TMI action plan mission origin and timing.

Note 7
This mission was established by the post-TMI action plan and models personnel traveling from offsite locations to the TSC at the time of highest dose rate. For conservatism, EPU retains the post-TMI action plan mission origin and timing.

Note 8
This mission was established by the post-TMI action plan and models personnel traveling from offsite locations to the CR at the time of highest dose rate. For conservatism, EPU retains the post-TMI action plan mission origin and timing.

Insert D:
Post-accident OLTP vital area mission doses were calculated for the post-TMI action plan (NUREG 0737 Item II.B.2). Vital area mission doses were re-evaluated at CLTP to support Alternative Source Term implementation. Because the proposed EPU increases the core source term, reduces MSIV leakage, and uses Cline elemental iodine removal efficiencies, the II.B.2 vital area mission doses were recalculated incorporating the current station physical layout and procedures. Regulatory Guide 1.3 shine dose rates from the post-TMI action plan are linearly scaled for EPU power. The submergence dose rates are explicitly computed per Regulatory Guide 1.183 to account for EPU core source term, reduced MSIV leakage, and use of Cline elemental iodine removal efficiencies. As documented in Table 2.9-11, all EPU vital area mission doses satisfy the GDC 19 limit.

Attachment 4

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

<u>Revised Response to AHPB-HP-RAI-4</u>

Revised Response to Accident and Health Physics Human Performance (AHPB) Request for Additional Information

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.

The NRC reviewed the information supporting the proposed amendment and by letter dated August 15, 2013, (ADAMS Accession No. ML13221A064), the AHPB requested additional information. EGC provided responses in Supplement 11 to the EPU LAR by letter dated September 13, 2013 (ADAMS Accession No. ML13260A076). Subsequent to submittal of Supplement 11, EGC determined that the response to AHPB-HP-RAI-4 erroneously mixed single unit and dual unit results in the offsite dose table and did not include the lower half of the table. As a result of these errors, a thorough review of the underlying calculations was performed that generated additional corrections to Table 4-1 and changes to PUSAR Section 2.10.1.2.4 *Public and Offsite Radiation Exposures*. The revised response to AHPB-HP-RAI-4 is provided below and supersedes the previous response. Additions are indicated by **bolded** characters and deletions are indicated with ~~strikethrough~~ markers.

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.

PUSAR Section 2.10.1.2.4 *Public and Offsite Radiation Exposures* on page 2-514 (third paragraph) is revised as follows to correspond to the corrected and revised data in Table 4-1:

"The dry storage of spent fuel is the major source of offsite dose, with a design basis contribution of approximately ~~10.8~~ **10.80** mrem/year to the limiting dose receptor location subject to the limits of 40 CFR 190 (25 mrem/year from effluents and external shine). The maximum annual dose to members of the public from all contributing PBAPS fuel cycle components, with EPU, is conservatively estimated to be ~~12.9~~ **12.958** mrem/**yr** total body. The maximum dose to any organ from all gaseous pathways is ~~9.85~~ **21.40** mrem/yr ~~per unit~~ (compared with 10 CFR 50, Appendix I limit of ~~15~~ **30** mrem/yr~~/unit~~). The maximum dose to any organ from all liquid pathways is ~~1.89~~ **3.780 m**rem/yr~~/unit~~ (compared with 10 CFR 50, Appendix I limit of ~~10~~ **20** mrem/yr~~/unit~~)."

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 GASPAR computer codes. The pre-release version of Regulatory 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 GASPAR computer codes and in accordance with Regulatory Guide 1.109 Rev 1. The comparison of Column 4 with Column 3 shows the effect of changing computer codes and Regulatory 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 Regulatory 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, cow's milk ingestion, and gaseous inhalation.
- Pathway dose conversion factors from Regulatory 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 Regulatory 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 for the Station							
	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 (for the station)
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)	0.240	0.250	0.946	0.592	0.676	0.015	6
Maximum dose to any organ from all pathways (mrem/yr)	2.800	2.900	14.68	3.300	3.780	0.037	20
Gaseous Effluents							
Gamma dose in air from noble gases (mrad/yr)	0.720	0.760	1.990	1.926	2.200	0.182	20
Beta dose in air from noble gases (mrad/yr)	0.920	0.970	1.604	1.032	1.178	0.125	40
Maximum dose to total body of an individual (mrem/yr)	0.480	0.500	1.362	1.298	1.482	0.347	10
Maximum dose to skin of an individual (mrem/yr)	1.000	1.100	2.660	2.260	2.580	0.473	30

10CFR50 Appendix I Dose Analysis							
Type of Dose	Maximum Public Individual Doses for Gaseous and Liquid Releases for the Station						
	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 (for the station)
Column 1	Column 2	Column 3	Column 4	Column 4a	Column 5	Column 6	Column 7
Maximum dose to any organ from all pathways from radioiodines and particulates (mrem/yr)	5.400	5.700	26.80	18.66	21.40	1.780	30
Calculation Methodology							
Source Term Liquid Effluent Analysis Gaseous Effluent Analysis Dose Conversion Factor and Methodology	Pre-Release Version of GALE Pre-Release Version of LADTAP Pre-Release Version of GASPAR Pre-Release Version of RG 1.109		Pre-Release Version of GALE NRCDose 2.3.16 - LADTAP (2010) NRCDose 2.3.16 - GASPAR (2010) RG 1.109, Rev. 1 (1977)	ANSI/ANS-18.1-1999 NRCDose 2.3.16 - LADTAP (2010) NRCDose 2.3.16 - GASPAR (2010) RG 1.109, Rev. 1 (1977)	ANSI/ANS-18.1-1999 NRCDose 2.3.16 - LADTAP (2010) NRCDose 2.3.16 - GASPAR (2010) RG 1.109, Rev. 1 (1977)	N/A	
Additional Information	Column 2 was multiplied by 1.05 (conservative previous power rerate multiplier) to generate the values in Column 3.		Column 4a shows the doses for 3528 MWt 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, free from the effects of the power increase. Column 5 shows the doses computed for EPU. The comparison of Column 5 against Column 4a shows the EPU effect upon the doses, free from the change in source term, Reg Guide, and code versions. The source term in Column 5 was multiplied by 3528 / 4030 to generate the source term to calculate the values in Column 4a.				

10CFR20, Appendix B, Table 2 Liquid and Gaseous Effluent Concentration Analysis		
Liquid Effluents - Sum of Isotopic Fractions of Limits (unitless)	0.00037	
Gaseous Effluents - Sum of Isotopic Fractions of Limits (unitless)	0.01089	
All individual isotope effluent concentrations are also within 10CFR20, Appendix B, Table 2 limits.		
Offsite Direct Dose Contributors Contributor		
Independent Spent Fuel Storage Installation [Note 1] (mrem/yr)	10.80	
Low Level Radioactive Waste Storage Facility (mrem/yr)	Negligible - less than 1 mrem/yr	
N-16 Shine (mrem/yr)	Negligible - per TLD measurements	
Note 1: Based on measurements and calculations for nearest receptor to ISFSI Pad.		
40CFR190 Site Evaluation - 25 mrem/yr Limit		
Independent Spent Fuel Storage Installation (mrem/yr)	10.80	
Station Gaseous Effluent Releases (mrem/yr)	1.482	
Station Liquid Effluent Releases (mrem/yr)	0.676	
Total (mrem/yr)	12.958	

Attachment 5

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Revised Enclosure 9e (CST Modifications) to EPU LAR

Revised Enclosure 9e (Condensate Storage Tank Modifications)

As stated in Enclosure 9e of the PBAPS EPU LAR Attachment 9, the Condensate Storage Tank (CST) is the only suction source for the High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) pumps during 10 CFR 50 Appendix R events. Section 3.2 (page 7) of Enclosure 9e discusses the results of the minimum water volume requirements evaluation in the Appendix R analysis and the amount of water that must be available for gravity feed from the RWST to the CST with an assumed fire affecting only one unit. However, there are certain Appendix R fire areas that require a fire safe shutdown for both units with reliance on the CST for both units. The revision to Enclosure 9e below provides the bounding CST and RWST water volume requirements for an Appendix R event affecting both units. Additions are indicated with **bolded** characters and deletions are indicated with ~~strikethrough~~ markers.

Additionally, the modification process has further refined the value of the CST dedicated usable volume reported in Sections 3.1 and 3.2 of Enclosure 9e. The CST dedicated usable volume of 101,109 gallons is replaced with 100,722 gallons in Section 3.1. The clarified text in Section 3.2 for both the new bounding water volume requirements and the CST dedicated usable volume are provided below.

Enclosure 9e Section 3.2 paragraph:

3.2 Operational Change - Maintain RWST Inventory to Supplement the CST Inventory

Purpose/Justification:
For EPU, the CST is credited as the primary HPCI and RCIC makeup water source to the RPV for the EPU SBO, ATWS, and Appendix R scenarios. Therefore, HPCI or RCIC pump suction swap over from the CST to the suppression pool must be controlled. The swap over occurs at the low CST level limit setpoint, which is 5.63 feet above the tank bottom. The setpoint provides margin to the TS low level of 5.25 feet above the tank bottom. To prevent swap over, the RWST will be used to supply additional inventory to the CST. This will be accomplished by gravity draining the RWST supply to the CST through lineups of existing valves. Procedure changes are required to ensure the RWST inventory is transferred to the CST in a timely manner to prevent HPCI and RCIC swap over from CST to the suppression pool.

The dedicated usable volume for the CST is approximately ~~101,109~~**100,722** gallons. For SBO at EPU conditions, the maximum CST usage is 94,570 gallons. This usage volume is well within the dedicated usable volume of the CST and use of RWST volume is not necessary for the SBO event. Therefore, the CST volume required for SBO is bounded by the CST volume required for ATWS and Appendix R events.

For ATWS at EPU conditions, the maximum CST usage is approximately 120,000 gallons. Therefore, the ATWS requires a water volume that exceeds the CST dedicated usable volume of ~~101,109~~**100,722** gallons. Following EPU implementation, a minimum volume of water is required to be maintained in both the CST and the RWST for ATWS. The Appendix R scenario discussed below requires an even greater volume of condensate transferred from the RWST, and therefore, bounds the condensate required from the RWST for the ATWS event. Required tank volumes and levels will be administratively controlled based on Appendix R event analysis.

For the bounding Appendix R Shutdown Method analysis at EPU conditions, the maximum CST usage is approximately 154,000 gallons. Therefore, the Appendix R event requires a condensate volume that exceeds the CST inventory. This event analysis requires the maximum CST usage at EPU. Following EPU implementation, a minimum volume of condensate is required to be maintained in both the CST and the RWST to mitigate the Appendix R event.

The CST dedicated usable volume following EPU is approximately 100,722 gallons. The existing CST low level alarm point is adequate to be used as the initial action point for Operators to ensure the volume in the CST does not decrease below the dedicated usable volume of 100,722 gallons.

The remainder of the needed condensate supply for mitigating the Appendix R event is provided from the RWST. The additional volume required to complete the Appendix R event mitigation is approximately 53,278 gallons for each unit affected by the Appendix R event. For some fires, both units may be affected by the fire and would have to be shutdown using one of the Appendix R shutdown methods. Each unit has its own CST, each with a dedicated usable volume following EPU of about 100,722 gallons. Since there is one common RWST that supplies both units, it must be capable of simultaneously supplying both CST's with the additional volume needed to mitigate the Appendix R event on each unit. The minimum required RWST volume for the bounding Appendix R scenario is calculated to be about 142,000 gallons for a single unit or about 227,300 gallons for two units. These volumes include the RWST unusable volume, the volume required for the scenario, and the additional volume in the RWST to establish adequate head to provide makeup flow. The minimum volumes in the CST and RWST will be administratively controlled.

~~Appendix R Shutdown Method A1 provides the bounding CST usage of 154,000 gallons. Therefore, the Appendix R event requires a condensate volume that exceeds the CST inventory. Following EPU implementation, a minimum volume of condensate is required to be maintained in both the CST and the RWST for Appendix R.~~

~~The CST dedicated usable volume following EPU is approximately 101,109 gallons. The 24.83 foot level in the CST is associated with the 101,109 gallon dedicated usable volume. The existing CST low level alarm point at 27.25 feet provides approximately 113,886 gallons of usable volume and provides a margin of approximately 12,777 gallons to the dedicated usable Condensate Storage Tank (CST) Modifications volume. Therefore, the existing low level alarm point will be used as the initial action point for Operators to ensure the volume in the CST does not decrease below the dedicated usable volume of 101,109 gallons.~~

~~The remainder of the needed condensate supply for mitigating the Appendix R event is provided from the RWST. The RWST volume required to complete the Appendix R event mitigation is approximately 52,891 gallons, which is approximately 4.65 feet of level in the RWST. The usable RWST volume is that volume above the 5.63 foot level associated with the CST low level swap over setpoint. Therefore, the required RWST volume corresponds to a RWST level of approximately 10.28 feet. In order to ensure~~

~~appropriate driving head for the gravity drain to the CST, the RWST minimum level is conservatively set at 12 feet. The 12 foot level will be the RWST low level alarm point. Therefore, the RWST dedicated usable volume will be 72,450 gallons.~~

~~The minimum volume required by the Appendix R analysis is assured by maintaining a combined inventory in the CST and RWST that is greater than the usable CST and RWST volumes added to the CST and RWST unusable tank volumes. The unusable CST volume is the volume below the 5.63 foot low level switchover setpoint. This unusable CST volume is approximately 29,768 gallons. The unusable RWST volume is that volume below the elevation of the 5.63 foot CST low level switchover setpoint. The unusable RWST volume is approximately 64,033 gallons. The combined unusable tank volume, when added to the volumes associated with the minimum CST and RWST tank levels of 24.83 feet and 12 feet, equates to a minimum required volume for the combined CST and RWST. This minimum required combined volume is approximately 267,360 gallons. Controlling the combined volume in the CST and RWST above 270,000 gallons ensures the Appendix R required volume is available and is conservative. The minimum combined volume in the CST and RWST will be administratively controlled.~~

Attachment 6

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Correction to Technical Specifications Pages Submitted in Supplement 16

Correction to Technical Specifications Pages Submitted in Supplement 16

Attachment 3 to Supplement 16 to EPU LAR contained replacement pages for Technical Specifications page 3.3-7 for Unit 2 and Unit 3 to make minor editorial corrections, however, it did not correctly reflect other changes provided in Supplement 5. The correction is provided in this Attachment for Unit 2 and Unit 3.

Table 3.3.1.1-1 (page 1 of 3)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION D.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Wide Range Neutron Monitors					
a. Period-Short	2	3	G	SR 3.3.1.1.1 SR 3.3.1.1.5 SR 3.3.1.1.12 SR 3.3.1.1.17 SR 3.3.1.1.18	≥ 13 seconds
	5(a)	3	H	SR 3.3.1.1.1 SR 3.3.1.1.6 SR 3.3.1.1.12 SR 3.3.1.1.17 SR 3.3.1.1.18	≥ 13 seconds
b. Inop	2	3	G	SR 3.3.1.1.5 SR 3.3.1.1.17	NA
	5(a)	3	H	SR 3.3.1.1.6 SR 3.3.1.1.17	NA
2. Average Power Range Monitors					
a. Neutron Flux-High (Setdown)	2	3(c)	G	SR 3.3.1.1.1 SR 3.3.1.1.8 SR 3.3.1.1.11 SR 3.3.1.1.12	≤ 15.0% RTP
b. Simulated Thermal Power-High	1	3(c)	F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.11 SR 3.3.1.1.12 ← (e), (f)	≤ ~~0.65~~ 0.55 W + ~~63.7%~~ 63.3% RTP(b) and ≤ 118.0% RTP
c. Neutron Flux-High	1	3(c)	F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.11 SR 3.3.1.1.12	≤ 119.7% RTP
d. Inop	1,2	3(c)	G	SR 3.3.1.1.11	NA
e. 2-Out-Of-4 Voter	1,2	2	G	SR 3.3.1.1.1 SR 3.3.1.1.11 SR 3.3.1.1.17 SR 3.3.1.1.18	NA
f. OPRM Upscale	≥ ~~25%~~ 23% RTP	3(c)	I	SR 3.3.1.1.1 SR 3.3.1.1.8 SR 3.3.1.1.11 SR 3.3.1.1.12 SR 3.3.1.1.19	(d)

(continued)

(a) With any control rod withdrawn from a core cell containing one or more fuel assemblies.

(b) ~~0.65~~ 0.55 (W - ΔW) + ~~63.7%~~ 61.5% RTP when reset for single loop operation per LCO 3.4.1, "Recirculation Loops Operating."

(c) Each APRM channel provides inputs to both trip systems.

(d) See COLR for OPRM period based detection algorithm (PBDA) setpoint limits.

Insert B

Section 3.3.1.1 Insert B

(e) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(f) The instrument channel set point shall be reset to a value that is within the Leave Alone Zone (LAZ) around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided the as-found tolerance and LAZ apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance. The NTSP methodologies used to determine the as-found tolerance and the LAZ are specified in the Bases associated with the specified function.

Table 3.3.1.1-1 (page 1 of 3)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION D.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
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	5[(a)]	3	H	SR 3.3.1.1.1 SR 3.3.1.1.6 SR 3.3.1.1.12 SR 3.3.1.1.17 SR 3.3.1.1.18	≥ 13 seconds
b. Inop	2	3	G	SR 3.3.1.1.5 SR 3.3.1.1.17	NA
	5[(a)]	3	H	SR 3.3.1.1.6 SR 3.3.1.1.17	NA
2. Average Power Range Monitors					
a. Neutron Flux-High (Setdown)	2	3[(c)]	G	SR 3.3.1.1.1 SR 3.3.1.1.8 SR 3.3.1.1.11 SR 3.3.1.1.12	≤ 15.0% RTP
b. Simulated Thermal Power-High	1	3[(c)]	F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.11 SR 3.3.1.1.12 ← (e), (f)	≤ ~~0.65~~ 0.55 W + ~~63.7~~ 63.3 % RTP[(b)] and ≤ 118.0% RTP
c. Neutron Flux-High	1	3[(c)]	F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.11 SR 3.3.1.1.12	≤ 119.7% RTP
d. Inop	1,2	3[(c)]	G	SR 3.3.1.1.11	NA
e. 2-Out-Of-4 Voter	1,2	2	G	SR 3.3.1.1.1 SR 3.3.1.1.11 SR 3.3.1.1.17 SR 3.3.1.1.18	NA
f. OPRM Upscale	~~≥25%~~ 23% RTP	3[(c)]	I	SR 3.3.1.1.1 SR 3.3.1.1.8 SR 3.3.1.1.11 SR 3.3.1.1.12 SR 3.3.1.1.19	(d)

(continued)

(a) With any control rod withdrawn from a core cell containing one or more fuel assemblies.

(b) ~~0.65~~ 0.55 (W - ΔW) + ~~63.7~~ 61.5 % RTP when reset for single loop operation per LCO 3.4.1, "Recirculation Loops Operating."

(c) Each APRM channel provides inputs to both trip systems.

(d) See COLR for OPRM period based detection algorithm (PBDA) setpoint limits.

Insert B

Section 3.3.1.1 Insert B

(e) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

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