Exelon Generation

~~PROPRIETARY INFORMATION – WITHHOLD UNDER 10 CFR 2.390~~

10 CFR 50.90
10 CFR 2.390

May 24, 2013

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

Peach Bottom Atomic Power Station, Units 2 and 3
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 3
Response to Request for Additional Information - Extended Power Uprate

Reference:
1. Exelon letter to the NRC, "License Amendment Request - Extended Power Uprate," dated September 28, 2012 (ADAMS Accession No. ML122860201)
2. NRC letter to Exelon, "Request for Additional Information Regarding License Amendment Request for Extended Power Uprate (TAC NOS. ME9631 AND ME9632)," dated April 26, 2013 (ADAMS Accession No. ML13106A126)

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. During their technical review of the application, the NRC Staff identified the need for additional information. Reference 2 provides the Request for Additional Information.

This letter addresses requests from the staff of eight Branches of the U. S. Nuclear Regulatory Commission to provide information in support of the request for amendment for the extended power uprate. Additional time was granted for the responses to Questions EEEB-1 through EEEB-3. Responses to those questions will be provided in a separate letter by June 10, 2013.

Attachment 5 contains Proprietary Information. When separated from Attachment 5, this document is decontrolled.

GE Hitachi Nuclear Energy America (GEH) considers portions of the information provided in the attached response to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. The proprietary information in Attachment 5 is clearly identified; this information has been redacted from Attachment 10. In accordance with 10 CFR 2.390, EGC requests Attachment 5 be withheld from public disclosure. An affidavit supporting this request for withholding is included as Attachment 9. A non-proprietary version of this information is provided in Attachment 10.

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.

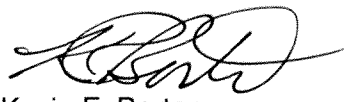
In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the Commonwealth of Pennsylvania and the State of Maryland of this application by transmitting a copy of this letter along with the non-proprietary attachments to the designated State Officials.

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 24th day of May.

Respectfully,



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

Attachments:

1. Response to Request for Additional Information – AADB
2. Response to Request for Additional Information – AFPB
3. Response to Request for Additional Information – AHPB
4. Response to Request for Additional Information – EEEB
5. Response to Request for Additional Information – EICB - Proprietary
6. Response to Request for Additional Information – EPTB
7. Response to Request for Additional Information – ESGB
8. Response to Request for Additional Information – EVIB
9. Affidavit in Support of Request to Withhold Information
10. Response to Request for Additional Information – EICB – non-proprietary

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

Attachment 1

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Response to Request for Additional Information - AADB

Response to Request for Additional Information

Accident Dose 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 April 26, 2013 (NRC Accession No. ML13106A126) has requested information to clarify the submittal. The response to that request is provided below.

AADB RAI-1

In an effort to ensure a complete and accurate review of the dose consequence analyses, please provide additional information (preferably in tabular form) describing, for each design-basis accident affected by the proposed EPU, all the basic parameters used in the dose consequence analyses. For each parameter, please indicate the current licensing basis (CLB) value, the revised EPU value where applicable, as well as the basis for any changes to the CLB. The NRC staff notes that some of the requested information has been provided in textual form in Section 2.9.2, "Radiological Consequences Analyses Using Alternative Source Terms," of Attachment 4 to the application dated September 28, 2012. The NRC staff requests that the information in Section 2.9.2 be expanded to include all of the basic parameters whether or not the individual parameter is being changed for the EPU amendment. The staff also finds it helpful if the information is presented in separate tables for each affected accident.

RESPONSE

1 Introduction

The basic parameters, necessary to prepare a confirmatory Extended Power Uprate (EPU) dose calculation, are supplied by this RAI response.

The NRC-approved Alternative Source Term (AST) (Reference 6) serves as the baseline dose analysis for Peach Bottom. This RAI response presents the data necessary to convert the baseline Reference 6 Current Licensing Basis (CLB) dose analysis into an EPU dose analysis.

EPU alters the atmospheric dispersion factors (X/Qs) to accommodate extended dose calculation times. The complete EPU X/Qs are presented in Table 3-1 through Table 3-5, and these tables correspond to Reference 6, Table 3-1 through Table 3-3.

Plant physical parameters associated with the dose analyses, such as volumes and elevations, are unaffected by EPU, and remain unchanged from CLB to EPU. In some cases (e.g., Table 4), the EPU analysis involved more detailed data; The EPU data and its corresponding CLB data are presented for clarity. Table 4 corresponds to Reference 6, Table 4.

Tables 5 through 8 provide the accident specific inputs and only show the changes made for EPU. These tables correspond to Reference 6, Tables 5 through 8.

Per the NRC-EGC clarification call on 4/17/13, the NRC indicated they did not need EGC to provide an EPU core nuclide inventory (source term) or the previously supplied AST inputs as defined by Reference 6.

RG 1.183 (Reference 1) supplies the inputs to both the Current License Basis (CLB) and the EPU analyses. Examples of these inputs include the BWR core inventory fraction, the non-LOCA fraction of fission product inventory in gap, the LOCA release phases, the radionuclide groups, and the assumptions supplied by the relevant appendices. There are no changes to any RG 1.183 input from CLB to EPU.

2 Discussion of Analyses

2.1 Atmospheric Dispersion Factors

2.1.1 Introduction

The Reference 6 X/Q tables are grouped by location; however, the CLB accidents did not use the same X/Q values or durations, at each location in the same manner. Therefore, this RAI response groups the X/Q values by accident to ensure their application is clear. Tables 3-1 through 3-5 are provided in this RAI response to show the X/Q values and durations used in the CLB and EPU analyses, and the changes to any X/Q values for EPU.

2.1.2 LOCA

The atmospheric dispersion factors (X/Q) used in the CLB Design Basis Accident (DBA) Loss of Coolant Accident (LOCA) dose calculations are unaffected by EPU as shown in Tables 3-1 and 3-2.

2.1.3 FHA

The CLB Fuel Handling Accident (FHA) dose calculation was performed for a 24-hour accident duration. The CLB calculation preparer verified that no significant dose increase was noted after 24 hours. The EPU FHA dose calculation is performed for 720 hours to maximize inputs common to all dose calculations. The EPU X/Q values are calculated via a site-specific X/Q calculation and are provided in Table 3-3.

2.1.4 CRDA

The CLB Control Rod Drop Accident (CRDA) dose calculation was performed for a 24-hour accident duration for the CR and LPZ dose calculations. The CLB calculation preparer verified that no significant dose increase was noted after 24 hours. A 2-hour accident duration was performed for the EAB dose calculation. (The CLB 2-hour EAB evaluation was performed because the worst 2-hour dose for the EAB was found to be from 0-2 hours.) The EPU CRDA dose calculation is performed for 720 hours to maximize inputs common to all dose calculations. The worst case 2-hour dose is reported for the EAB. The X/Q values are calculated via a site-specific X/Q calculation and are provided in Table 3-4.

2.1.5 MSLB

The EPU Main Steamline Break (MSLB) Exclusion Area Boundary (EAB) and Low Population Zone (LPZ) atmospheric dispersion factors are updated using a site-specific X/Q calculation. This differs from the CLB MSLB evaluation which used X/Q values calculated using guidance from RG 1.5.

There is no Control Room (CR) X/Q used in the MSLB accident because CR dose at the air intake is calculated due to the radioactive cloud submergence.

Table 3-1
Peach Bottom
LOCA Containment and ESF Leakage Atmospheric Dispersion Factors

CLB	
Location: CR	
Release Location: Off-Gas Stack	
Time Interval [hrs]	X/Q [sec/m^3]
0-0.05	1.18×10^{-3}*
0.05-2	3.31×10^{-6}
2-8	1.00×10^{-15}
8-24	1.00×10^{-15}
24-96	1.64×10^{-8}
96-720	4.54×10^{-9}

EPU	
Location: CR	
Release Location: Off-Gas Stack	
Time Interval [hrs]	X/Q [sec/m^3]
0-0.05	1.18×10^{-3}*
0.05-2	3.31×10^{-6}
2-8	1.00×10^{-15}
8-24	1.00×10^{-15}
24-96	1.64×10^{-8}
96-720	4.54×10^{-9}

Location: EAB	
Release Location: Off-Gas Stack	
Time Interval [hrs]	X/Q [sec/m^3]
0-0.05	9.11×10^{-4}
0.05-0.5	5.30×10^{-5}
0.5-720	9.17×10^{-6}

Location: EAB	
Release Location: Off-Gas Stack	
Time Interval [hrs]	X/Q [sec/m^3]
0-0.05	9.11×10^{-4}
0.05-0.5	5.30×10^{-5}
0.5-720	9.17×10^{-6}

Location: LPZ	
Release Location: Off-Gas Stack	
Time Interval [hrs]	X/Q [sec/m^3]
0-0.05	1.38×10^{-4}
0.05-0.5	1.75×10^{-5}
0.5-2	9.05×10^{-6}
2-8	4.01×10^{-6}
8-24	2.67×10^{-6}
24-96	1.10×10^{-6}
96-720	3.10×10^{-7}

Location: LPZ	
Release Location: Off-Gas Stack	
Time Interval [hrs]	X/Q [sec/m^3]
0-0.05	1.38×10^{-4}
0.05-0.5	1.75×10^{-5}
0.5-2	9.05×10^{-6}
2-8	4.01×10^{-6}
8-24	2.67×10^{-6}
24-96	1.10×10^{-6}
96-720	3.10×10^{-7}

* Conservative ground release used during 3 minute containment drawdown

Table 3-2
Peach Bottom
LOCA MSIV Leakage Atmospheric Dispersion Factors

CLB	
Location: CR	
Release Location: U2 TB/RB Exhaust Vent	
Time Interval [hrs]	X/Q [sec/m^3]
0-2	1.18×10^{-3}
2-8	9.08×10^{-4}
8-24	4.14×10^{-4}
24-96	2.90×10^{-4}
96-720	2.26×10^{-4}

EPU	
Location: CR	
Release Location: U2 TB/RB Exhaust Vent	
Time Interval [hrs]	X/Q [sec/m^3]
0-2	1.18×10^{-3}
2-8	9.08×10^{-4}
8-24	4.14×10^{-4}
24-96	2.90×10^{-4}
96-720	2.26×10^{-4}

Location: EAB	
Release Location: U2 TB/RB Exhaust Vent	
Time Interval [hrs]	X/Q [sec/m^3]
0-2	9.11×10^{-4}
2-720	9.11×10^{-4}

Location: EAB	
Release Location: U2 TB/RB Exhaust Vent	
Time Interval [hrs]	X/Q [sec/m^3]
0-2	9.11×10^{-4}
2-720	9.11×10^{-4}

Location: LPZ	
Release Location: U2 TB/RB Exhaust Vent	
Time Interval [hrs]	X/Q [sec/m^3]
0-2	1.38×10^{-4}
2-8	5.81×10^{-5}
8-24	3.77×10^{-5}
24-96	1.48×10^{-5}
96-720	4.15×10^{-6}

Location: LPZ	
Release Location: U2 TB/RB Exhaust Vent	
Time Interval [hrs]	X/Q [sec/m^3]
0-2	1.38×10^{-4}
2-8	5.81×10^{-5}
8-24	3.77×10^{-5}
24-96	1.48×10^{-5}
96-720	4.15×10^{-6}

Table 3-3
Peach Bottom
FHA Atmospheric Dispersion Factors

CLB	
Location: CR	
Release Location: Unit 2 Roof Scuttle	
(Ground Level Release)	
Time Interval [hrs]	X/Q [sec/m^3]
0-24*	1.90×10^{-3}

EPU	
Location: CR	
Release Location: Unit 2 Roof Scuttle	
(Ground Level Release)	
Time Interval [hrs]	X/Q [sec/m^3]
0-2	1.90×10^{-3}
2-8	1.33×10^{-3}
8-24	5.96×10^{-4}
24-96	4.18×10^{-4}
96-720	3.27×10^{-4}

Location: EAB	
Ground Level Release	
Time Interval [hrs]	X/Q [sec/m^3]
0-24*	9.11×10^{-4}

Location: EAB	
Ground Level Release	
Time Interval [hrs]	X/Q [sec/m^3]
0-720	9.11×10^{-4}

Location: LPZ	
Ground Level Release	
Time Interval [hrs]	X/Q [sec/m^3]
0-24*	1.38×10^{-4}

Location: LPZ	
Ground Level Release	
Time Interval [hrs]	X/Q [sec/m^3]
0-2	1.38×10^{-4}
2-8	5.81×10^{-5}
8-24	3.77×10^{-5}
24-96	1.48×10^{-5}
96-720	4.15×10^{-6}

* The 0-2 hour X/Q is used for the 24 hour accident duration

Table 3-4
Peach Bottom
CRDA Atmospheric Dispersion Factors

CLB	
Location: CR	
Release Location: Turbine Building	
Release Location: U2 TB/RB Exhaust Vent	
Time Interval [hrs]	X/Q [sec/m^3]
0-2	1.18×10^{-3}
2-8	9.08×10^{-4}
8-24	4.14×10^{-4}

EPU	
Location: CR	
Release Location: Turbine Building	
Release Location: U2 TB/RB Exhaust Vent	
Time Interval [hrs]	X/Q [sec/m^3]
0-2	1.18×10^{-3}
2-8	9.08×10^{-4}
8-24	4.14×10^{-4}
24-96	2.90×10^{-4}
96-720	2.26×10^{-4}

Location: EAB	
Release Location: U2 TB/RB Exhaust Vent	
Time Interval [hrs]	X/Q [sec/m^3]
0-2	9.11×10^{-4}

Location: EAB	
Release Location: U2 TB/RB Exhaust Vent	
Time Interval [hrs]	X/Q [sec/m^3]
0-720	9.11×10^{-4}

Location: LPZ	
Release Location: U2 TB/RB Exhaust Vent	
Time Interval [hrs]	X/Q [sec/m^3]
0-2	1.38×10^{-4}
2-8	5.81×10^{-5}
8-24	3.77×10^{-5}

Location: LPZ	
Release Location: U2 TB/RB Exhaust Vent	
Time Interval [hrs]	X/Q [sec/m^3]
0-2	1.38×10^{-4}
2-8	5.81×10^{-5}
8-24	3.77×10^{-5}
24-96	1.48×10^{-5}
96-720	4.15×10^{-6}

Table 3-5
Peach Bottom
MSLB Atmospheric Dispersion Factors

CLB	
Location: CR	
Release Point: Main Steam Line	
Time Interval [hrs]	X/Q [sec/m^3]
Puff Release	N/A

EPU	
Location: CR	
Release Point: Main Steam Line	
Time Interval [hrs]	X/Q [sec/m^3]
Puff Release	N/A

Location: EAB	
Release Point: Main Steam Line	
Release Location: Ground Level Release	
Time Interval [hrs]	X/Q [sec/m^3]
Puff Release	4.29×10^{-4}

Location: EAB	
Release Point: Main Steam Line	
Release Location: Ground Level Release	
Time Interval [hrs]	X/Q [sec/m^3]
Puff Release	9.11×10^{-4}

Location: LPZ	
Release Point: Main Steam Line	
Release Location: Ground Level Release	
Time Interval [hrs]	X/Q [sec/m^3]
Puff Release	5.97×10^{-5}

Location: LPZ	
Release Point: Main Steam Line	
Release Location: Ground Level Release	
Time Interval [hrs]	X/Q [sec/m^3]
Puff Release	1.38×10^{-4}

2.2 Control Room Data and Assumptions

The control room data and assumptions used for the CLB Design Basis Accident (DBA) dose calculations remain the same for EPU, with the exception of the CRDA control room unfiltered inleakage, as reported in Table 4. The remaining inputs clarify how inputs were applied for the CLB analysis, and these inputs remain unchanged for EPU.

Table 4

Peach Bottom EPU AST Control Room Data and Assumptions

Control Room Normal Intake Flow				
Accident Calculation	**Units**	**CLB**	**EPU**	**Notes**
LOCA	cfm	18,500	18,500	Conservatively assumed based on parametric study to maximize CR dose during drawdown. Used for < 0.5 hrs, switch to unfiltered inleakage plus MCREV flowrate for ≥ 0.5 hrs.
FHA	cfm	20,600	20,600	Normal intake flow rate, MCREV not credited
CRDA	cfm	20,600	20,600	
MSLB	cfm	N/A	N/A	CR dose at the air intake is calculated due to the radioactive cloud submergence, therefore MCREV response is not modeled
Assumed Control Room Unfiltered Inleakage				
Accident Calculation	**Units**	**CLB**	**EPU**	**Notes**
LOCA	cfm	500	500	Station tracer gas testing validates acceptability of 500 scfm. Used for ≥ 0.5 hrs
FHA	cfm	1,600	1,600	MCREV not credited, use of 1,600 is conservative for normal control room air inleakage
CRDA	cfm	1,600	500	Station tracer gas testing validates acceptability of 500 scfm.
MSLB	N/A	N/A	N/A	MCREV not credited
Main Control Room Emergency Ventilation Pressurization Flow Rate (Filtered)				
Accident Calculation	**Units**	**CLB**	**EPU**	**Notes**
LOCA	cfm	2,700	2,700	Conservatively assumed to be 10% lower than the normal MCREV flow rate of 3000 scfm, ≥ 0.5 hours
FHA	N/A	N/A	N/A	MCREV not credited
CRDA	N/A	N/A	N/A	
MSLB	N/A	N/A	N/A	
Control Room Operator Breathing Rate				
Accident Calculation	**Units**	**CLB**	**EPU**	**Notes**
LOCA	m^3/sec	3.5×10^{-4}	3.5×10^{-4}	Per RG 1.183
FHA	m^3/sec	3.47×10^{-4}	3.5×10^{-4}	EPU updated to be consistent with RG 1.183, CLB used RADTRAD default of 3.47x10-4
CRDA	m^3/sec	3.47×10^{-4}	3.5×10^{-4}	
MSLB	m^3/sec	3.47×10^{-4}	3.5×10^{-4}	

2.3 Loss of Coolant Accident (LOCA) Dose Analysis

The isotopic core inventory (source term) is updated for EPU to incorporate the new equilibrium End of Cycle (EOC) core average exposure, fuel enrichment values and fuel type. Fuel enrichments that bound the expected EPU fuel design are evaluated in the source term calculation, and the final bounding isotopic distribution used in the LOCA calculation uses the most limiting source term from these bounding enrichments. This is a change from using a single enrichment used for CLB. The isotopic inventory is calculated in an EPU-specific source term calculation.

The plant physical parameters (i.e., air space volumes and flow rates) are unchanged except for the Main Steam Isolation Valve (MSIV) leakage rates and the containment leakage rate. The allowable MSIV leakage rates are being reduced as described in Reference 2 to ensure the post-LOCA CR dose remains within the acceptable levels per 10 CFR 50.67. Containment leakage is no longer crediting the 50% reduction allowed by RG 1.183; rather containment leakage for EPU is modeled as 100% of the 0.7 w%/day for the full accident duration.

Elemental iodine removal efficiencies in each steam line are calculated using the methodology in Reference 4 for EPU, rather than the methodology in Reference 5 used for CLB. The EPU values are presented in Table 5.

Table 5			
Peach Bottom EPU AST Data and Assumptions for the LOCA			
Parameter	**Units**	**EPU Value**	**Notes**
Analysis Thermal Power Level	MWt	4030 (includes 2% margin to rated power in accordance with RG 1.183)	EPU accident analysis power level
Containment Leak Rate into Reactor Building	w%/day	0.700 for 2 min to 720 hours	EPU does not take credit for reduction in leakage rate after first 24 hours to 50% of TS value in accordance with Reference 1
Peak Post LOCA Drywell Temperature	°F	305	Updated based on EPU specific post LOCA containment analysis
Peak Post LOCA Drywell Pressure	psig	49.1	EPU specific containment analysis confirms value is bounding
Elemental Iodine Removal by Drywell Deposition Cutoff Time	hours	3.80	Updated in EPU calculation based on EPU specific data
Total MSIV Leak Rate Through All Four Lines	scfh	300 for 720 hours @ 49.1 psig	Change submitted as part of LAR, Reference 2 section 3.1.17
MSIV Leak Rate Through One Line With MSIV Failed	scfh	150 for 720 hours @ 49.1 psig	Change submitted as part of LAR, Reference 2 section 3.1.17
MSIV Leak Rate Through 1 of 3 Intact Lines	scfh	150 for 720 hours @ 49.1 psig	Change submitted as part of LAR, Reference 2 section 3.1.17
MSIV Leak Rate Through Remaining 2 of 3 Intact Lines	scfh	0 for 720 hours @ 49.1 psig	Change submitted as part of LAR, Reference 2 section 3.1.17
Table 5 is continued next page			

Table 5 (continued from previous page)			
Peach Bottom EPU AST Data and Assumptions for the LOCA			
Parameter	**Units**	**EPU Value**	**Notes**
Equilibrium EOC core average exposure	MWd/MTU	36,471	Decreases for EPU due to different fuel design (GNF2), calculated in EPU specific reactor core and fuel performance calculation and used in source term calculation
Bounding Fuel Enrichment	%	3.80 and 4.20	Changed based on new fuel (GNF2) and core design for EPU
Elemental Iodine Removal Efficiency for Failed Line, Outboard MSIV to TSV			
0 min - 2 min	%	0	Calculated using Reference 4, only credited through 96 hours of accident duration
2 min - 8 hours		11.27	
8 - 24 hours		14.89	
24 - 48 hours		25.00	
48 - 72 hours		47.07	
72 - 96 hours		71.01	
Elemental Iodine Removal Efficiency for Intact Line, RPV to Outboard MSIV			
0 min - 2 min	%	0	Calculated using Reference 4, only credited through 96 hours of accident duration
2 min - 8 hours		4.45	
8 - 24 hours		5.96	
24 - 48 hours		10.40	
48 - 72 hours		21.67	
72 - 96 hours		38.24	
Elemental Iodine Removal Efficiency for Intact Line, Outboard MSIV to TSV			
0 min - 2 min	%	0	Calculated using Reference 4, only credited through 96 hours of accident duration
2 min - 8 hours		11.40	
8 - 24 hours		15.05	
24 - 48 hours		25.25	
48 - 72 hours		47.45	
72 - 96 hours		71.41	

Other basic parameters found in Table 5 of Reference 6 remain unchanged from CLB to EPU

2.4 Fuel Handling Accident (FHA) Dose Analysis

As with the LOCA analysis described above, the isotopic core inventory (source term) is updated for EPU to incorporate the new Equilibrium EOC Core Average exposure, enrichment values and fuel type.

For fuel bundle parameters (e.g. number of fuel pins per bundle), the changes are related to changing fuel types from GE14 to GNF2. The number of damaged fuel bundles changes for GNF2 because there are fewer full length effective pins in a GNF2 fuel bundle compared to a GE14 bundle. Therefore, the number of damaged bundles increases slightly, and the damaged core fraction also increases slightly as shown in Table 6.

Table 6

Peach Bottom EPU AST Data and Assumptions for the FHA

Parameter	Units	EPU Value	Notes
Analysis Thermal Power Level	MWt	4030	EPU accident analysis power level
Number of Fuel Pins per Bundle		85.6	Reduction in number of pins per bundle due to change from GE14 to GNF2
Number of Damaged Fuel Assemblies		2.009	Increase in number of damaged bundles due to change from GE14 to GNF2
Limiting Damaged Core Fraction with Power Factor (PF)		0.00447	Increase in limiting damaged core fraction due to change from GE14 to GNF2
CR Occupancy Factors	%	0-24 hours: 100 24-96 hours: 60 96-720 hours: 40	Change due to increasing model duration from 24 hours to 720 hours

Other basic parameters found in Table 6 of Reference 6 remain unchanged from CLB to EPU

2.5 Control Rod Drop Accident (CRDA) Dose Analysis

As with the LOCA analysis described above, the isotopic core inventory (source term) is updated for EPU to incorporate the new Equilibrium EOC Core Average exposure, enrichment values and fuel type.

For fuel bundle parameters (e.g. number of fuel pins per bundle), the changes are related to changing fuel types from GE14 to GNF2. The number of breached fuel rods does not change for GNF2 compared to a GE14 bundle.

Table 7

Peach Bottom EPU AST Data and Assumptions for the CRDA

Parameter	Units	EPU Value	Notes
Analysis Thermal Power Level	MWt	4030	EPU accident analysis power level
Number of Fuel Pins per Bundle		85.6	Reduction in number of pins per bundle due to change from GE14 to GNF2
Damaged Fuel Rods: Breached Fuel Rods Melted Fuel Rods		1200 breached rods 5.0% of breached rods melt	Includes added margin
CR Occupancy Factors		0-24 hours: 1 24-96 hours: 0.6 96-720 hours: 0.4	Change due to increasing model duration from 24 hours to 720 hours

Other basic parameters found in Table 7 of Reference 6 remain unchanged from CLB to EPU

2.6 Main Steam Line Break (MSLB) Accident Dose Analysis

Case 1, as defined by UFSAR Section 14.9.2.3, is based on the equilibrium iodine concentration permitted for continued full power operation of 0.2 µCi/gm Dose Equivalent (D.E.) I-131 as defined by the Peach Bottom Technical Specification 3.4.6 "RCS Specific Activity."

Case 2, as defined by UFSAR Section 14.9.2.3, is based on a pre-accident iodine spike of 4.0 µCi/gm D.E. I-131, as defined by Peach Bottom Technical Specification 3.4.6, Condition A.

The MSLB accident does not use core source term because there is no fuel failure predicted; rather it uses the coolant source term. The CLB analysis uses coolant source concentrations from the UFSAR for iodine isotopes and from a site specific calculation for noble gas isotopes. EPU uses values calculated in the EPU specific coolant source term calculation. To obtain an EPU noble gas concentration, the noble gas emission rate from the EPU specific coolant source term calculation, is divided by the EPU steam flow rate.

Table 8

Peach Bottom EPU AST Data and Assumptions for the MSLB

Parameter	Units	EPU Value	Notes
Analysis Thermal Power Level	MWt	4030	EPU accident analysis power

Iodine Isotope Activity			Notes
Isotope	Case 1 [Ci]	Case 2 [Ci]	The iodine concentrations updated using EPU specific coolant source term evaluation
I-131	6.38E+00	1.28E+02	
I-132	5.85E+01	1.17E+03	
I-133	4.26E+01	8.51E+02	
I-134	1.06E+02	2.13E+03	
I-135	6.12E+01	1.22E+03	

Noble Gas Activity			Notes
Isotope	Case 1 [Ci]	Case 2 [Ci]	The noble gas concentrations updated using EPU specific coolant source term evaluation
Kr-83M	6.45E-03	6.45E-03	
Kr-85M	1.23E-02	1.23E-02	
Kr-85	5.42E-05	5.42E-05	
Kr-87	3.35E-02	3.35E-02	
Kr-88	3.93E-02	3.93E-02	
Kr-89	3.93E-04	3.93E-04	
Xe-131M	4.45E-05	4.45E-05	
Xe-133M	6.45E-04	6.45E-04	
Xe-133	1.87E-02	1.87E-02	
Xe-135M	1.55E-02	1.55E-02	
Xe-135	4.90E-02	4.90E-02	
Xe-137	1.55E-03	1.55E-03	
Xe-138	4.64E-02	4.64E-02	

MSIV Isolation Time	sec	10.5	Includes added margin
Mass of Reactor Coolant Released From Break	lbm	189,888	EPU value is the CLB value scaled up conservatively by 15%
Mass of Reactor Steam Released from Break	lbm	29,670	EPU value is the CLB value scaled up conservatively by 15%
Flashing Fraction (Mass of Reactor Coolant Released from Break that Flashes to Steam)	%	100	EPU conservatively models all coolant that escapes the break flashes to steam
Fraction of Steam Cloud Mass Carrying Activity	%	4	Includes added margin

Other basic parameters found in Table 8 of Reference 6 remain unchanged from CLB to EPU

3. References

1. U.S. NRC Regulatory Guide 1.183, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, July 2000.

2. Exelon Letter, "License Amendment Request - Extended Power Uprate," Attachment 1 (Evaluation of Proposed Changes), dated September 28, 2012 (ML12286A012).

3. NEDC-33566P, Revision 0, Safety Analysis Report for Exelon Peach Bottom Atomic Power Station Units 2 and 3, Constant Power Pressure Uprate, September 2012 (Attachment 4 to PBAPS EPU LAR, ML12286A011).

4. J.E. Cline, "MSIV Leakage Iodine Transport Analysis," Letter Report Dated March 26, 1991 (ML003683718).

5. AEB 98-03, Assessment of Radiological Consequences for the Perry Pilot Plant Application Using the Revised (NUREG-1465) Source Term (ML011230531)

6. Peach Bottom Atomic Power Station, Units 2 and 3 - Issuance of Amendments RE: Application of Alternative Source Term Methodology (TAC Nos. MD6806 and MD6807), September 5, 2008 (ML082320406)

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 - AFPB

Response to Request for Additional Information

Fire Protection 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 April 26, 2013 (NRC Accession No. ML13106A126) has requested information to clarify the submittal. The response to that request is provided below.

AFPB RAI-1

Section 2.5.1.4.1, "Fire Protection Program," of Attachment 4 to the application dated September 28, 2012, states, in part, that "the higher decay heat associated with EPU may reduce the time available for the operator to perform the actions necessary to achieve and maintain cold shutdown conditions." The NRC staff requests the licensee to verify that additional heat in the plant environment from the EPU will not: (1) interfere with required operator manual actions being performed at their designated time, or (2) require any new operator actions to maintain hot shutdown and then place the reactor in a cold shutdown condition.

RESPONSE

Reactor operating pressure and temperature do not change with EPU. The increased decay heat results in additional heat input to the torus due to reactor pressure relief via the main steam safety relief valves. There are operator manual actions performed in rooms where torus temperature is the dominant environmental impact; however, EPU peak torus temperature is less than analyzed previously due to input changes associated with containment accident pressure (CAP) credit elimination and the RHR cross tie modification. As a result, there is no impact in plant environmental conditions between Current Licensed Thermal Power (CLTP) and EPU in the plant areas where the operator manual actions are required to achieve and maintain cold shutdown conditions in the event of a fire. Therefore, EPU will not: 1) impact any required operator manual actions being performed at their designated time, nor (2) require any new operator actions to maintain hot shutdown and then place the reactor in a cold shutdown condition.

AFPB RAI-2

Section 2.5.1.4.1, "Fire Protection Program," of Attachment 4 to the application dated September 28, 2012, states, in part, that:

> Modifications to the CST [condensate storage tank] will be implemented to ensure that sufficient inventory is available for the EPU Appendix R scenarios that credit the CST. Because the CST is credited as the exclusive HPCI [high-pressure coolant injection] and RCIC [reactor core isolation cooling] makeup water source to the RPV [reactor pressure vessel] for the EPU Appendix R analysis, additional modifications will be implemented to ensure the CST makeup flowpath to HPCI and RCIC is available for Appendix R scenarios that credit HPCI and RCIC. Except for the CST modifications that are required, other safe shutdown systems and equipment used to achieve and maintain cold shutdown conditions do not change, and are adequate for the EPU conditions.

The NRC staff notes that modifications associated with the CST, HPCI, and RCIC have not yet been completed to address the impact on the fire protection program. The staff requests that the licensee discuss how the results of modifications associated with the CST, HPCI, and RCIC would impact the fire protection program and the plant's compliance with the fire protection program licensing basis, 10 CFR 50.48 or applicable portions of 10 CFR 50, Appendix R. Also clarify how the licensee will ensure that, once developed and implemented, the modifications will not change this impact.

In addition, clarify whether this amendment request involves other plant modifications, or changes to the fire protection program planned at EPU conditions (e.g., adding new cable trays, re-routing of existing cables, increases in combustible loading affecting fire barrier ratings, or changes to administrative controls). If any, the NRC staff requests the licensee to identify such proposed modifications and discuss their impact on the plant's compliance with the fire protection program licensing basis, 10 CFR 50.48, or applicable portions of Appendix A to Branch Technical Position (BTP) Auxiliary and Power Conversion Systems Branch (APCSB) 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants, Docketed Prior to July 1, 1976."

RESPONSE

Section 3.0 of Enclosure 9e of the PBAPS License Amendment Request provides additional details of the CST, HPCI and RCIC modifications planned for EPU. This enclosure also states that because the post-EPU design requirements place greater reliance on the CST and RWST, the post-EPU configuration will be evaluated to identify any potential circuits or equipment that are required to perform a safe shutdown function and could be affected by a design basis fire. Any identified components or circuits that require modification for continued compliance with the PBAPS Fire Protection Plan following EPU will be modified in accordance with PBAPS Fire Protection Plan Program requirements and will be developed through the EGC Configuration Change Process.

Attachment 9 of the PBAPS License Amendment Request provides a listing and discussion of the modifications planned for EPU. The impact of these modifications on

the PBAPS Fire Protection Program will be evaluated in accordance with EGC's configuration change process. Per the process, these modifications will be evaluated to assure the changes do not impact the approved Fire Protection Program and will not adversely impact the ability to achieve and maintain safe shutdown in accordance with the current Peach Bottom license conditions and procedures.

AFPB RAI-3

Some plants credit aspects of their fire protection system for other than fire protection activities (e.g., utilizing the fire water pumps and water supply as backup cooling or inventory for non-primary reactor systems). If PBAPS credits its fire protection system in this way, the licensee should identify the specific situations and discuss to what extent, if any, the EPU affects these "non-fire-protection" aspects of the plant fire protection system. If PBAPS does not take such credit, the NRC staff requests that the licensee verify this as well.

RESPONSE

PBAPS does not use the Fire Protection System for non-fire protection activities in any Design Basis scenario. The PUSAR (Section 2.5.1.4.1) does describe non-fire suppression uses when outside the plant design basis. The non-fire protection uses, which are not affected by EPU, are:

1. Reactor Pressure Vessel injection when preferred water sources are not available,
2. Makeup to the Spent Fuel Pool,
3. Radiological release scrubbing, and
4. Direct makeup to the Emergency Cooling Tower, and
5. External makeup to the condensate system hotwell.

These uses of the fire protection system are beyond the plant design bases. These uses of the fire protection system for non-fire suppression functions are consistent with industry-accepted guidelines.

There is no other approved non-fire suppression use of fire protection water. Thus, the fire protection system design demands will not be impacted except in the case of a beyond design basis event where system use could be directed consistent with industry accepted guidelines.

Attachment 3

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Response to Request for Additional Information - AHPB

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 April 26, 2013 (NRC Accession No. ML13106A126) has requested information to clarify the submittal. The response to that request is provided below.

AHPB RAI-1

Section 2.11.1.2, "Changes to Operator Actions Sensitive to Power Uprate," of Attachment 4 to the application dated September 28, 2012, identifies 3 new operator actions needed as a result of the proposed EPU as follows:

- A new operator action will be created to place the residual heat removal (RHR) heat exchanger cross-tie valve in service if required to mitigate a rise in suppression pool temperature during the accident or event.

- A new operator action will be created to start a second high-pressure service water (HPSW) pump and establish a flowpath through the second RHR heat exchanger when the RHR heat exchanger cross-tie is in service. In connection with this, there will be an operator action to place the HPSW cross-tie in service if required.

- A new operator action will be created to refill the condensate storage tank from the refueling water storage tank about 90 minutes after the start of the event.

Are there any other new operator actions needed as a result of the proposed EPU?

RESPONSE

PUSAR Section 2.11.1, Human Factors, describes new operator actions required as a result of EPU. Section 5.0 of Enclosures 9c (RHR Heat Exchanger Cross-Tie Modification) and 9d (HPSW Cross-Tie Modification) of the application dated September 28, 2012 provide additional details specific to the RHR and HPSW operator actions.

A supplement to the application describing additional changes to the RHR Heat Exchanger Cross-tie Modification is being prepared for submittal to the NRC. The supplement will include a revision to Section 2.11.1 that will include additional operator actions.

AHPB RAI-2

In addition to the new operator actions discussed above in AHPB RAI-1, Section 2.11.1.2, of Attachment 4 to the application dated September 28, 2012, discusses a number of changes to current operator actions that will occur as a result of the proposed EPU. Please delineate which of these changes are related to emergency or abnormal operating procedures.

RESPONSE

Section 2.11.1.1 of Attachment 4 to the application dated September 28, 2012, identifies changes to the Emergency Operating Procedures (EOPs) and Abnormal Operating Procedures (AOPs) that will occur as a result of the proposed EPU.

Sections 2.11.1.2 and 2.11.1.3 of Attachment 4 to the application dated September 28, 2012, discuss new operator actions and a number of changes to current operator actions that will occur as a result of the proposed EPU.

The table below delineates the changes in Sections 2.11.1.2 and 2.11.1.3 and their relationship to emergency and abnormal operating procedures.

A supplement to the application describing additional changes to the RHR Heat Exchanger Cross-tie Modification is being prepared for submittal to the NRC. The supplement will include a revision to Section 2.11.1 that will include additional operator actions. The supplement will include an update of the table describing the impact of these new operator actions on the EOPs and AOPs.

2.11.1.2.1 ACTIONS	**PROCEDURE TYPE**
Place the RHR heat exchanger cross-tie valve in service.	EOP
Start a second HPSW Pump and establish a flow path through the second RHR Heat Exchanger when the RHR heat exchanger cross-tie is in service, and place the HPSW cross-tie in service, if required.	EOP
Control the depressurization of the units to minimize the impact of a rise in suppression pool temperature associated with the interruption of containment cooling (SPC or sprays) that occurs upon receipt of a LOCA signal.	AOP
2.11.1.2.2 ACTIONS	**PROCEDURE TYPE**
Refill the CST from the Refueling RWST during Method "A", "B" and "D" shutdowns to maintain ECCS pump suction on the CST rather than the suppression pool, and ensure NPSH margin.	AOP
The time is reduced in which an operator is required to secure from the CR a HPCI pump that has spuriously started from 10 to 7.5 minutes during a Method "A" shutdown without a SORV.	AOP

Reduce the time for entry into ASDC from 210 minutes to160 minutes during a Method "A" shutdown with a SORV.	EOP
Increase the time for initiation of ASDC from 30 minutes to14 hours during Method "C" shutdowns, while decreasing the time for initiation of RPV depressurization from 27.5 minutes to 26.5 minutes for case C1 and from 15 minutes to 14.7 minutes for case C2.	EOP
Increase the time for initiation of ASDC from 300 minutes to 364 minutes during Method "D" shutdowns, without a SORV, while decreasing the time for initiation of RPV depressurization from 5 hours to 3.5 hours.	AOP
Decrease the time for initiation of SPC from 4 to 2.5 hours during Method "D" shutdowns, with a SORV, while without a SORV decrease the time for initiation of SPC from 180 minutes to 150 minutes.	AOP
Increase the time for initiation of ASDC from 240 minutes to 270 minutes during Method "D" shutdowns, with a SORV.	AOP
2.11.1.3 ACTIONS	**PROCEDURE TYPE**
Balance flow through the RHR heat exchangers when operating with the RHR heat exchanger cross-tie open.	EOP
Manually control the transfer of power for the HPSW cross-tie MOV from the Normal to Alternate source or vice versa.	AOP

AHPB RAI-3

Section 2.11.1.2, of Attachment 4 to the application dated September 28, 2012, identifies the following changes in operator response time due to the proposed EPU:

- Operating procedures will be revised to reduce the time in which an operator is required to secure from the control room a high-pressure coolant injection pump that has spuriously started from 10 to 7.5 minutes during a Method "A" shutdown without a stuck-open relief valve (SORV).

- During a Method "A" shutdown with a SORV, the EPU analysis has determined that the time for entry into alternate shutdown cooling (ASDC) is reduced from 210 to 160 minutes.

- During Method "C" shutdowns, the EPU analysis has determined that the times for initiation of ASDC has increased from 30 minutes to 14 hours while the time after the event in which the operator must initiate reactor pressure vessel (RPV) depressurization has decreased from 27.5 minutes to 26.5 minutes for case C1, and 15 minutes to 14.7 minutes for case C2.

- During Method "D" shutdowns, without a SORV, the EPU analysis has determined that the times for initiation of ASDC has increased from 300 to 364

minutes while the time after the start of the event in which the operator must initiate RPV depressurization has decreased from 5 to 3.5 hours.

- During Method "D" shutdowns, with a SORV, the EPU analysis has determined that the time after the event for initiation of suppression pool cooling (SPC) has decreased from 4 to 2.5 hours, while without a SORV the time for initiation of SPC has decreased from 180 to 150 minutes.

Are there any other operator actions that will involve additional response time or will have reduced time available?

RESPONSE

Section 2.11.1.2 of Attachment 4 describes the operator actions involving additional response time or where reduced time is available.

A supplement to the application describing additional changes to the RHR Heat Exchanger Cross-tie Modification is being prepared for submittal to the NRC. The supplement will include a revision to Section 2.11.1 that will address any changes associated with operator response times associated with changes to the EPU modifications.

AHPB RAI-4

Identify any operator actions that are being automated or being changed from automatic to manual as a result of the proposed EPU. Provide justification for the acceptability of these changes.

RESPONSE

There are no operator actions that are being automated or changed from automatic to manual associated with the PBAPS EPU.

AHPB RAI-5

Were any human factors lessons-learned from any other plant EPU experiences? If yes, please describe.

RESPONSE

Yes, human factors lessons-learned from other plant EPU experiences were considered and incorporated into the PBAPS EPU project.

The following activities were performed to identify human factors lessons-learned:

1. Reviewed industry lessons-learned via INPO 09-005, March 2009, Power Uprate Implementation Strategies – A Leadership Perspective,

2. Reviewed industry lessons-learned via INPO SER 05-2, Lessons Learned from Power Uprates,
3. Reviewed power ascension plans from Nine Mile Plant Unit 2 (NMP) and Grand Gulf Nuclear Station Unit 1 (GGNS),
4. Participated in industry Licensing Manager's Peer Group for Power Uprates, and
5. Performed benchmarking with GGNS, Turkey Point Nuclear Generating Station (TPNGS), and Susquehanna Steam Electric Station (SSES).

The following initiatives were applied from the lessons learned:

1. Full-time assignment of two currently licensed operators to the EPU project,
2. Assessment of changes to operating margins of equipment and systems to identify, evaluate and address potential operator challenges, and
3. Involvement of station organizations in the development and review of changes related to the EPU project.

Attachment 4

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Response to Request for Additional Information - EEEB

Response to Request for Additional Information

Electrical Engineering 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 April 26, 2013 (NRC Accession No. ML13106A126) has requested information to clarify the submittal. The response to that request is provided below. Additional time was requested to provide the responses to EEEB questions 1 through 3. The responses to those questions will be provided by June 10, 2013.

EEEB RAI-4

Attachment 3, "Revised Generator Data," to Enclosure 11a to Attachment 11 to the application dated September 28, 2012, provides net and gross megawatt electric (MWe) values different than those shown on pages 2-174 and 2-175 of Attachment 4 to the application. Please clarify what the maximum gross and net MWe values will be at EPU conditions (including the associated power factor and reactive power values).

RESPONSE

The values on pages 2-174 and 2-175 of Attachment 4 are the generator ratings (i.e., equipment ratings) and do not reflect the maximum MWe output of the unit at either CLTP or EPU. The EPU generator ratings are shown on the Reactive Capability Curves, which are provided in both LAR Attachment 4 (Figures 2.5-8a and 2.5-8b) and in Attachment 11 (see Attachment 2 to Enclosure 11a.)

The predicted maximum unit winter gross output at EPU conditions is 1370 MWe. 1370 MWe was chosen for the PJM Interconnection (i.e., the Regional Transmission Organization) System Impact Study (LAR Attachment 11, Enclosure 11a) as the highest bounding electrical output of the main generators under EPU conditions. The associated power factor and MVARs at 1370 MWe are shown in Table I "Reactive Power Requirement" of Enclosure 11a.

The generator maximum net output at EPU conditions (i.e., Generator Gross 1370 MWe – Unit Auxiliary Transformer (UAT) 30.6 MWe) is 1339.4 MWe. The UAT loads (30.6 MW and 15 MVAR) are shown in Attachment 3 to Enclosure 11a.

EEEB RAI-5

On page 2-127 of Attachment 4 to the application dated September 28, 2012, the licensee states that the grid analysis has determined that the EPU will not require transmission system upgrades. Provide the maximum apparent power through the switchyard components (tie-line, breakers, disconnects, buses, etc.) and show that the said component's ratings exceed the apparent power they are exposed to at EPU conditions.

RESPONSE

As noted during the NRC-EGC clarification call on 4/17/13, Exelon is responsible for the plant interface between the Generator Step-Up transformer and switchyard. The high voltage components connecting the Generator Step-Up transformer voltage high side to the transmission grid are a tubular bus, a section of transmission line, and disconnect switches. Table 2.3-2, Offsite Electrical Equipment Ratings and Margins, on pg 2-143 of Attachments 4 and 6 of the LAR lists the most limiting equipment ratings and margins at 1530 MVA. The disconnect switches, which are the limiting components, have a margin of 25.6%. The ratings of the components exceed the apparent power at EPU conditions.

PJM Interconnection (PJM) is the Regional Transmission Organization (RTO) and is responsible for the transmission system, which includes the switchyard (i.e., the North and South Substations). The Peach Bottom EPU System Impact Study, performed by PJM, used 1370 MWe as the EPU bounding maximum winter gross unit output as stated on page 1 of Attachment 11. The System Impact Study (Enclosure 11a of Attachment 11) evaluated compliance with reliability criteria and concluded under "Network Impacts" and the "Delivery of Energy Portion of Interconnection Request", that there were no network impacts, issues, or operational restrictions.

EEEB RAI-6

On page 4 of Attachment 9 to the application dated September 28, 2012, the licensee states that the generator auxiliaries will be modified or retrofitted to accommodate the new generator rating. Provide a description of the auxiliary modifications.

RESPONSE

The main generators at Peach Bottom are being upgraded in support of the Extended Power Uprate which will increase their output ratings from 1280 MVA to 1530 MVA. The Unit 3 rotor will be replaced. The removed Unit 3 rotor will be rewound and installed in Unit 2. Also the existing excitation systems do not have sufficient capacity to allow the generators to operate at their new maximum rating. Therefore, the Unit 2 and Unit 3 generator auxiliaries will be modified as described below:

- The six (6) Alterrex Rectifiers will be replaced.
- The existing Alterrex alternator-exciter will be replaced.
- The automatic voltage regulator (AVR) will be replaced.

EEEB RAI-7

On page 2-128 of Attachment 4 to the application dated September 28, 2012, the licensee states that the isolated phase bus duct (IPDB) is being modified to increase its continuous current rating to provide for operation at EPU output. Furthermore on page 4 of Attachment 9 to the application, the licensee states that the modification will require replacement of several portions of the existing IPDB. Provide further discussion on these modifications, detailing the portions that will need replacement, their rating and their adequacy for operating at EPU conditions.

RESPONSE

The isolated phase bus duct (IPBD) modifications include:

- Replacing the generator bus and the Isophase Bus Duct (IPBD) ductwork located under the generator.
- Replacing portions of the main bus and ductwork between the generator bus and the three main power transformers that are connected in a delta configuration. The delta bus associated with the three main power transformers was found to be acceptable at EPU conditions and will not be replaced.
- Replacing the cooling ducts going to the 2C / 3C Main Power Transformers with larger ductwork to provide enhanced cooling capability.

The new ratings are provided in the table below. The isophase bus ratings can accommodate the maximum generator rated output and therefore are adequate for EPU conditions.

Bus Location	Bus Design Rating (Amps)	Bus Amps at Max Generator Design Output (1530 MVA @ 20.9KV)
Generator Bus	21,200	21,133
Main Bus	42,300	42,267
Delta Bus	24,500	24,403

EEEB RAI-8

On page 2-128 of Attachment 4 to the application dated September 28, 2012, the licensee states that other than those protective relays associated with the uprated main generator, the relay settings are unaffected by operation at EPU conditions. Provide a summary of the review performed for the protective relay settings at EPU load for the main generator, step-up transformer, and Class 1E transmission system. Also, clarify whether the existing under voltage and degraded voltage settings are adequate at EPU conditions.

RESPONSE

In accordance with the Exelon Configuration Control Procedures, the Generator modification and Main Power Transformer (MPT) replacements needed to support EPU required a review of the existing protective relay settings. Calculations were performed to evaluate the adequacy of the existing protective relaying potentially affected by the main generator modifications and the MPT replacements. As a result of this review, setting changes to the protective relays listed below are required:

- Distance Relay
- Out of Step Relay
- Stator Loss of Coolant Relays
- Generator Loss of Field Relays
- Generator Negative Sequence Relay
- Unit Differential Relay
- Line Overcurrent Fault Detector Relays
- Line Pilot Wire Relay

The results of the calculation determined that the generator and step-up transformer protective relaying, with the above changes, is adequate for EPU conditions.

The Class 1E transmission system (i.e., the onsite 1E distribution system) protective relays were determined to be adequate for operation at pre-EPU conditions. The relay settings were developed and validated based on the equipment ratings, and EPU modifications did not change the equipment ratings. Therefore, the protective relay settings remain adequate for EPU conditions.

An Electrical Transient Analysis Program (ETAP) analysis was performed to validate that the onsite electrical system voltage levels were acceptable with the proposed changes at EPU conditions. The under voltage and degraded voltage settings are adequate at EPU conditions.

EEEB RAI-9

Section 2.3.3.2 of Attachment 4 to the application dated September 28, 2012, states that the analytical electrical system computer model developed for PBAPS updated the main power transformer size to reflect the recent change of main power transformers and the proposed changes to main generators and condensate pumps. Provide a discussion on determining the adequacy of the ratings of the safety-related bus.

RESPONSE

The loading on the safety related 4kV buses were evaluated for EPU conditions using existing Peach Bottom calculations.

The safety related buses are rated for 8,646 KVA and the worst-case bus loading is 3,054 KVA. The safety buses have more than 50% margin available for bus loading post-EPU.

An Electrical Transient Analysis Program (ETAP) model of the station has been developed to analyze short circuit duties and to ensure that the switchgear and MCC equipment are still within their short circuit ratings. The analysis included the new plant changes due to EPU (1530 MVA generator, rewound generator, larger condensate pump motors, PECO/PJM data). The analysis demonstrates that the fault currents on the plant safety-related 4.16 kV buses are within the equipment ratings and capabilities. The momentary and interrupting margins for the safety-related 4kV safety buses all have 20% or more available margin at EPU conditions.

EEEB RAI-10

In Table 2.3-3 of Attachment 4 to the application dated September 28, 2012, the licensee provides the nameplate rating, required brake horsepower (BHP) and analyzed BHP for the condensate pumps. Discuss the apparent discrepancy between the condensate pumps nameplate rating and analyzed BHP at EPU conditions.

RESPONSE

In Table 2.3-3, the nameplate HP is indicated for the currently installed condensate pump motor. However, the condensate pump motors are being replaced with 5000 HP motors to accommodate EPU. The EPU plant electrical analysis was performed using the bounding value of 5000 BHP for the replacement condensate pump motors. A clarification of the table is presented below.

Motor Description	Nameplate HP CLTP / EPU	Required BHP		Analyzed BHP	
		CLTP	EPU	CLTP	EPU
Condensate Pump	4500 / 5000	4012	4183	4500	5000

EEEB RAI-11

On page 2-224 of Attachment 4 to the application dated September 28, 2012, the licensee states that an additional High-Pressure Service Water (HPSW) pump motor and Residual Heat Removal heat exchange cross-tie modifications will be needed due to the EPU. Provide a brief description of these modifications and its impact on the electric system. Provide the current licensed thermal power (CLTP) and EPU loading (kW), and continuous rating of the emergency diesel generators in light of these modifications. Also provide an electrical diagram that shows the additional HPSW pump and the cross-tie modifications.

RESPONSE

As discussed during the NRC-EGC clarification call on 4/19/13, Peach Bottom is not adding a new HPSW Pump motor – the line item was intended to indicate that a modification to support starting an additional HPSW pump motor and a modification to provide a Residual Heat Removal heat exchanger cross-tie are required to support EPU. Modification details are provided in Enclosure 9C (RHR HX Cross-Tie Modification) Section 4.0 (Scope of Modification) and 9D (HPSW Cross-tie Modification) Section 4.0 (Scope of Modification).

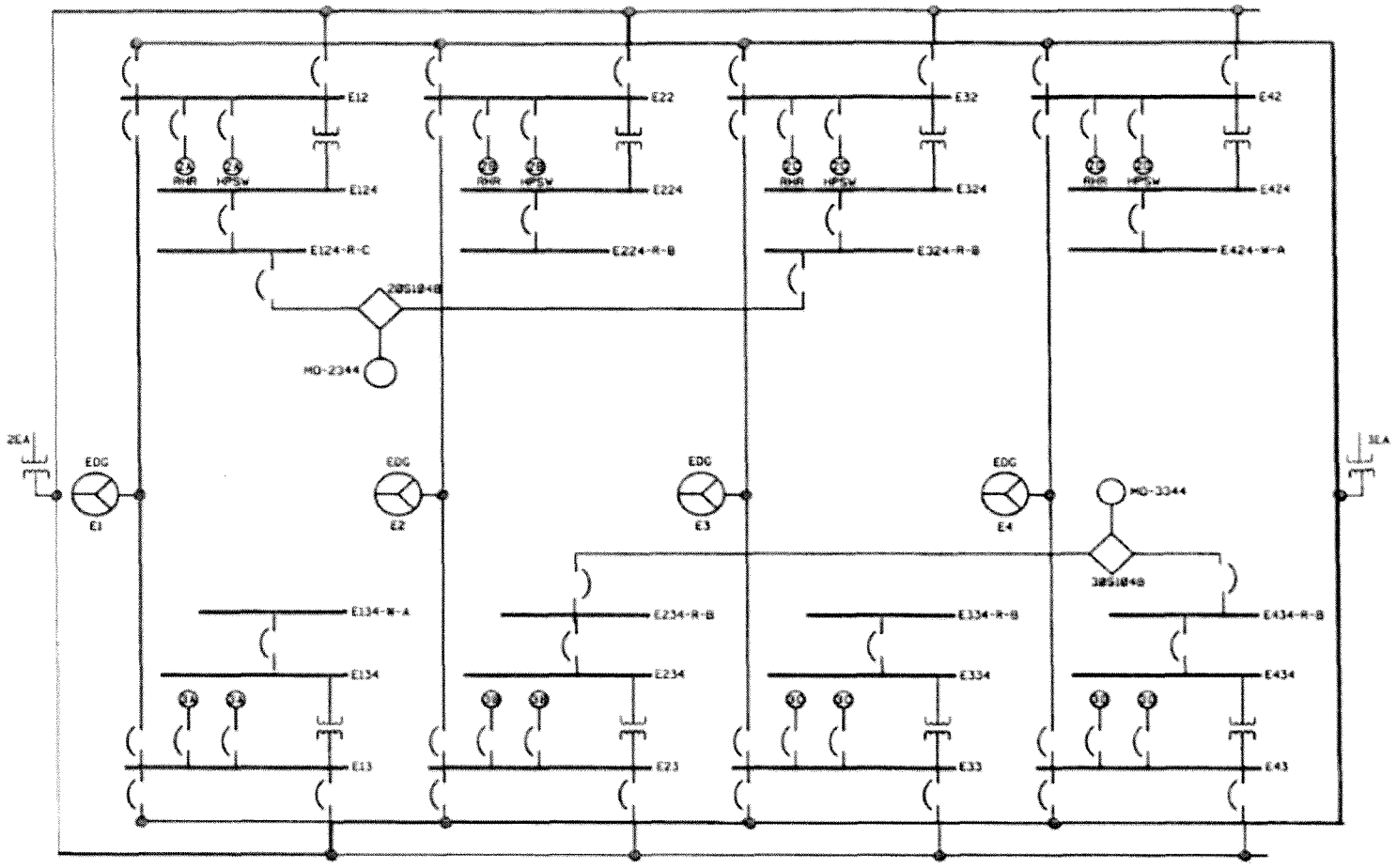
The current and the EPU 'worst-case' EDG loading conditions are summarized below to allow for comparison of the existing plant versus proposed modification loading (all values in kW).

Diesel	Peak Load per Time Period (CLTP kw / EPU kw)		
	0 – 10 min	10 – 60 min	Greater than 60 min
E1	2851 / 2761	2971 / 2781	2779 / 2835
E2	3050 / 2917	2506 / 2985	2967 / 2931
E3	2935 / 2828	2175 / 2765	2909 / 2810
E4	2962 / 2836	2830 / 2543	2900 / 2799

The continuous (annual, 8,760 hour) rating of the diesel generators is 2,600 kW. The 2,000 hour rating is 3,000 kW. The 200 hour rating is 3,100 kW and the 30 minute rating is 3,250 kW.

A sketch is provided to show the conceptual design for the HPSW Transfer Switch.

A supplement to the application is being prepared for submittal to the NRC that will describe changes to the RHR Heat Exchanger Cross-tie Modification. The supplement will include an updated electrical diagram.



EEEB-11 – HPSW Cross-connect Power Supply Conceptual Design Sketch

EEEB RAI-12

In Table 2.3-2 of Attachment 4 to the application dated September 28, 2012, the equipment list does not include the unit auxiliary transformers (UATs). Clarify if the UATs require any modifications for EPU operation.

RESPONSE

The UATs were evaluated for EPU conditions, and it was determined that margin exists; no UAT modifications are required to support EPU.

EEEB RAI-13

On page 2-133 of Attachment 4 to the application dated September 28, 2012, the licensee states that the only EPU effect to the DC system is the operation of the HPSW motor circuit breakers spring charging motor. Clarify whether the increased DC load will not adversely impact the capacity margin of the Class 1E battery. Clarify if there is any difference in capacity margin between CLTP and EPU conditions, for the Class 1E battery.

RESPONSE

The additional spring charging motor load resulting from the operation of the HPSW motor circuit breaker does not adversely impact the Class 1E battery capacity margin. At CLTP, the battery capacity margin is currently 4.86%. The additional spring charging motor load reduces the battery capacity margin to 4.78%.

EEEB RAI-14

On page 2-135 of Attachment 4 to the application dated September 28, 2012, the licensee states that, with respect to station blackout (SBO), sufficient compressed gas capacity remains to perform emergency reactor pressure vessel depressurization. Provide a summary of the evaluation showing that the compressed gas capacity exists under EPU conditions for required automatic and manual operation during an SBO event.

RESPONSE

An evaluation of the containment response during an SBO event was performed using the NRC-approved SHEX analysis code. This evaluation concluded the total number of safety relief valve (SRV) actuations (automatic and manual) required during the 8-hour SBO coping period increased from 107 for CLTP conditions to 109 for EPU conditions. The installed compressed gas capacity provides for 200 SRV cycles and design leakage over 7 days; thus there is adequate margin to perform emergency reactor pressure vessel depressurization.

EEEB RAI-15

On page 2-135 of Attachment 4 to the application dated September 28, 2012, the licensee states that areas containing equipment necessary to cope with an SBO event were evaluated for the effects of loss of ventilation due to an SBO. Provide a summary of this evaluation for the following areas: Control Room and Cable Spreading Room, Battery Room, Switchgear Room/Inverter Room, Drywell, Reactor Core Isolation Coolant Room, and High Pressure Coolant Injection Room.

RESPONSE

The EPU SBO evaluation used the "Alternate AC" power source approach (see Section 2.3) and the methodology of Section 2.7, "Effects of the loss of ventilation methodology," of NUMARC 87-00, (Revision. 1). The evaluation shows that equipment operability is maintained because the SBO environment is milder than the existing design and qualification bases, as summarized below:

The Drywell evaluation using SHEX determined that the temperature time history is bounded by the existing design and qualification bases.

Outside the Drywell, the SBO loss-of-ventilation evaluation for the Control Room and Cable Spreading Room, Battery Room, Switchgear Room/Inverter Room, Reactor Core Isolation Coolant Room, and High Pressure Coolant Injection Room determined that, compared to CLTP, there is no increase in initial temperature and heat load at EPU conditions. EPU does not impact the heat loads and resulting room temperatures.

Attachment 6

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Response to Request for Additional Information - EPTB

Response to Request for Additional Information

Component Performance and Testing 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 April 26, 2013 (NRC Accession No. ML13106A126) has requested information to clarify the submittal. The response to that request is provided below.

EPTB RAI-1

In Attachment 4 of the application dated September 28, 2012, the licensee notes in Section 2.2.4, "Safety-Related Valves and Pumps," that certain valves will be deleted from, and new valves added to, the inservice testing (IST) program. The licensee also notes that the surveillance procedure for the Standby Liquid Control Pump will be changed. Please provide a detailed summary of the changes to the PBAPS IST program due to the EPU conditions.

RESPONSE

The IST program will be revised to incorporate the following changes due to EPU:

1. For the Standby Liquid Control System the pump discharge pressure and the flow requirement will be changed.
2. For the CST modification, the new cross-tie valve will be added.
3. For the Residual Heat Removal System,
    a. the RHR heat exchanger cross-tie motor operated isolation valves and the RHR heat exchanger inlet control valves will be added for open and close stroke time testing and position verification testing, and
    b. the RHR pump baseline flow will be revised.
4. The new Main Steam Spring Safety Valve will be added to the safety relief components requiring IST performance testing.

The EGC September 28, 2012 application did not indicate that valves would be deleted from the IST program; this response confirms there are no valves to be deleted from the IST program as a result of EPU.

The EPU modifications are controlled by the EGC configuration change control process that requires applicable design considerations and impacts be identified. This impact evaluation requires the documentation of impacts on plant procedures, programs, and

departments. The impact on programs includes the impact on the IST program and is performed by the IST representative. Therefore, all IST changes will be identified and controlled in accordance with the configuration control process.

EPTB RAI-2

In Table 2.2-14, "EPU Effects to PBAPS Program Valves" of Attachment 4 of the application dated September 28, 2012, the licensee notes that various actions will be required for valves with Low Margin, Medium Margin or Negative Margin. Please specify the criteria for how the margins are determined, and describe the respective actions required (e.g., switch adjustments, valve modifications or valve replacements).

RESPONSE

Exelon provides direction in meeting the requirements of GL-89-10 / GL96-05 MOV program valves in the EGC Motor-Operated Valve Program procedures. The Periodic Verification Test margin categories of high, medium, and low are defined in these procedures as described below:

A. High Margin – Where Calculated Margin is equal to or greater than 10%.

B. Medium Margin – Where Calculated Margin is less than 10% but equal to or greater than 5%.

C. Low Margin – Where Calculated Margin is less than 5%.

As a result of valve program margin evaluations, no valves or valve operators require replacement for EPU. For the valves requiring margin improvements, the following are solutions used to restore margin as applicable:

- Overall Gear Ratio (OGR) change – replaces the motor pinion and worm shaft gear
- Installation of a four rotor limit switch to provide a full stroke torque switch bypass

Affected program MOVs will be returned to high margin by completion of margin improvement modifications and valve setup evaluations. The valves requiring modification will be completed prior to EPU power ascension in the fall of 2014 and 2015.

Attachment 7

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Response to Request for Additional Information - ESGB

Response to Request for Additional Information

Steam Generator Tube Integrity and Chemical Engineering 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 April 26, 2013 (NRC Accession No. ML13106A126) has requested information to clarify the submittal. The response to that request is provided below.

ESGB RAI-1

Based on review of Section 2.1.5, "Protective Coating Systems (Paints) - Organic Materials," of Attachment 4 to the application dated September 28, 2012, the NRC staff understands that the licensee does not have test documentation available for the Carboline Carbozinc 11 topcoated with Phenoline 368 (CZ11/368) coating system. It appears that the coating system has not been qualified to withstand a design-basis accident (DBA) and has not been tested to demonstrate that it will not adversely impact the emergency core cooling system (ECCS). In lieu of testing, the licensee performed an analysis to evaluate the acceptability of the coating system at EPU conditions. In order for the staff to complete its evaluation of the acceptability of the coating system at EPU conditions, please provide the following information:

a. Describe the current licensing basis with respect to the qualification testing for all safety-related coatings in containment.

b. For the coating system CZ11/368, please provide additional information to justify why this system will be able to endure EPU conditions, including how the CZ11/368 coating system was determined to be suitable to remain adhered to the wall in containment and the torus under post-accident conditions.

c. Discuss whether the CZ11/368 coating system has been repaired, remediated, or showed signs of degradation since being applied.

RESPONSE

a. The current PBAPS licensing basis with respect to the qualification testing for all safety-related coatings in containment is stated in the EGC Quality Assurance Topical Report (QATR), NO-AA-10, Appendix C, Section 1.3.1 item 3, as stated below.

> "ASTM D3843-93, "Standard Practice for Quality Assurance for Protective Coatings applied to Nuclear Facilities."

PBAPS shall comply with ASTM D3843-93 for safety-related protective coating work in service level 1 areas during operation with the following additional clarification, exception, and requirement.

A. For coating formulations developed prior to issuance of ASTM D3843-93, service level 1 qualification based on ANSI N5.9 (Revised as ANSI N5.12-1974) and ANSI N101.2 remains valid.

B. Section 10.1, last sentence - instead of references to ANSI N45.2 and NQA-1, inspections will be documented for record purposes as required by 10 CFR 50, Appendix B, and by this QA program description.

C. Limitations on use of coatings and cleaning materials which contain elements which could contribute to corrosion, inter-granular cracking, or stress corrosion cracking of safety-related stainless steel will be followed as described in Section C.4 of Regulatory Guide 1.54, June 1973."

The commitment to this ASTM Standard and the associated discussion was stated in the November 11, 1998, PBAPS response to Generic Letter 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment." This response was accepted by the U. S. Nuclear Regulatory Commission in a letter to PBAPS dated December 1, 1999.

b. Justification for the continued acceptability of the Service Level 1 CZ11/368 coating system used at PBAPS is supported by three parameters. The coating is currently acceptable, EPU conditions are not significantly different from current conditions and the monitoring program ensures continuing acceptability.

- The CZ11/368 coating system as installed in the wetwell airspace of Unit 2 and drywell of Units 2 and 3 at PBAPS currently meets the definition of an "acceptable" Service Level 1 coating system as defined in Electric Power Research Institute (EPRI) document 1019157, Guideline on Nuclear Safety-Related Coatings, Revision 2 (Formerly TR-109937 and 1003102) as detailed in EPU LAR Attachments 4 and 6.
- EPU conditions are not significantly different from current conditions (reference Sections 2.6 and 2.10 of EPU LAR Attachments 4 or 6).
    - Peak drywell pressure increases from 49.5 psig to 50.4 psig
    - Peak drywell temperature remains at 340 degrees F
    - Peak wetwell pressure increases from 32.3 to 32.4 psig
    - Peak wetwell temperature increases from 175 to 181 degrees F

- Section 2.10.1.2, Post-Accident Radiation Levels, of EPU LAR Attachments 4 and 6 states: "Post-operation radiation levels in most areas of the plant increase by no more than the percentage increase in power level. ... The increased post-accident radiation levels have no adverse effect on safety-related plant equipment."
  - Post accident drywell dose rates increase from 1.87E+8 to 2.14E+8 RAD
  - Post accident suppression chamber dose rates increase from 3.30E+7 to 3.77E+7 RAD

- The PBAPS Maintenance Rule Coatings Monitoring Program provides for periodic assessment and visual inspection of Service Level 1 coatings to ensure the coatings will continue to adhere to their drywell and wetwell airspace locations. EPRI report 1014883, "Plant Support Engineering: Adhesion Testing of Nuclear Coating Service Level I Coatings", supports the use of visual inspections to determine coating adhesion remains adequate. U. S. Nuclear Regulatory Commission letter, "NRC Staff Review Guidance Regarding Generic Letter 2004-02, Closure in the Area of Coatings Evaluation", dated March 2008, endorses the coating assessment method addressed in EPRI Report 1014883.

Reasonable justification is provided above that demonstrates the existing coating will remain adhered to the containment and torus following implementation of the proposed EPU under DBA LOCA conditions.

c. The CZ11/368 coating system at PBAPS has been appropriately inspected for signs of degradation per EGC procedure requirements. The CZ11/368 coating system has been repaired and remediated in accordance with the QATR commitment. Degraded and unqualified coatings are identified and evaluated in the PB unqualified coatings logs (UCLs) in accordance with EGC procedures. Conservative estimates of degraded coatings are incorporated in the UCLs to demonstrate continuing margin to ECCS NPSH limits.

ESGB RAI-2

On page 2-13 of Attachment 4 to the application dated September 28, 2012, it states that BIO-DUR 560BLUE is being used as a torus relining material and is qualified for EPU conditions.

a. Discuss the extent of application of this coating (e.g., 100 percent of torus, only wetted portions) and whether it is or will be applied to the torus of both units.

b. Discuss how the coating was DBA tested (see ASTM 3911).

c. Discuss whether the coating was manufactured using 10 CFR Part 50, Appendix B, requirements.

d. Discuss the qualification of personnel used to apply and inspect this coating.

RESPONSE

a. Within the Peach Bottom Unit 2 Torus, BIO-DUR 560BLUE was applied during the refueling outage in the fall of 2012. This coating was applied to all carbon steel surfaces one-foot above normal water level and all areas below the water level on Unit 2 except for the shell and ring girders which were coated from nominally one-foot below the normal water level and below. This was due to the existence of an epoxy band extending from one-foot below to one-foot above the normal water level. This epoxy band is comprised of CZ-11 primer with a Phenoline 368 epoxy topcoat. This band has been visually inspected and remains an acceptable coating system. Peach Bottom Unit 3 Torus is currently scheduled to be relined with BIO-DUR 560BLUE during the refueling outage in the fall of 2013. The Unit 3 relining scope may be adjusted similar to what occurred with Unit 2 based on inspection results.

b. BIO-DUR 560BLUE was qualified in accordance with the PBAPS current licensing basis. ASTM D3843-93, Standard Practice for Quality Assurance for Protective Coatings Applied to Nuclear Facilities, was utilized for the qualification.

   Section 6.1 of ASTM D3843-93 requires all qualifications of coatings materials to meet the applicable standards referenced in Guide D3842. Per ASTM D3842-86 (Reapproved 1991)*, Standard Guide for Selection of Test Methods for Coatings for Use in Light-Water Nuclear Power Plants, the following test methods apply:

   D3911 – 89* – Standard Test Method for Evaluating Coatings Used in Light-Water Nuclear Power Plants at Simulated Design Basis Accident (DBA) Conditions

   D3912 – 80* – Standard Test Method for Chemical Resistance of Coatings Used on Light-Water Nuclear Power Plants

   D4082 – 89* – Standard Test Method for Effects of Gamma Radiation on Coatings for Use in Light-Water Nuclear Power Plants

   D4256 – 89* – Standard Test Method for Determination of the Decontaminability of Coatings Used in Light-Water Nuclear Power Plants – This test method is no longer utilized and was not performed on the BIO-DUR 560BLUE coating material.

   * - Edition of standard that was in place in 1993.

   Testing was performed by Underwater Construction Corporation (UCC). UCC is a 10CFR50, Appendix B approved vendor on the Exelon Evaluated Vendors List (EVL) for supplying underwater protective coatings. Testing was performed in accordance with the UCC QA program. The test report associated with the BIO-DUR 560BLUE material lists the following test standards that were utilized during testing:

- Radiation Tolerance Testing in Accordance with ASTM D4082-89
- Simulated Design Basis Accident (DBA) Testing in Accordance with ASTM D3911-89
- Chemical Testing (Lining Test) in Accordance with ASTM D3912-80

Therefore, BIO-DUR 560BLUE coating material has been tested to meet the PB CLB, including DBA testing per ASTM D3911. The conditions under which the BIO-DUR 560BLUE was qualified are as shown in PUSAR Section 2.1.5. These conditions bound those of the EPU.

c. The coating manufacturer does not have a 10 CFR 50, Appendix B program. However, the coating supplier, Underwater Construction Corporation (UCC), is a 10CFR50, Appendix B approved vendor currently listed on the Exelon Evaluated Vendors List (EVL). UCC is approved for supplying underwater protective coatings. The BIO-DUR 560BLUE coating material underwent commercial grade dedication in accordance with the UCC QA program and has been supplied to Exelon as a basic component (safety related).

d. The surface preparation, coating application and inspection is performed by Williams Specialty Services (WSS). WSS is a 10 CFR 50, Appendix B supplier included on the Exelon EVL for protective coatings including surface preparation and painting. EVL comments state that vendor audits also verified WSS ability to perform inspection for protective coatings. All personnel utilized by WSS for this project were required to be qualified under the WSS QA program.

ESGB RAI-3

On page 2-14 of Attachment 4 to the application dated September 28, 2012, the licensee states, "PBAPS currently follows ASTM D3843-93 to fulfill 10 CFR 50, Appendix B [Quality Assurance], requirements with clarification, exception, and one additional requirement as stated in the PBAPS QATR [Quality Assurance Topical Report]." Regulatory Guide 1.54, "Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants," cites ASTM D3843-00 (reapproved 2008) as an acceptable standard for QA practices. Please provide a copy of the 1993 edition or discuss the differences between the 1993 and 2000 editions. Furthermore, provide a discussion on what is meant by, "...clarification, exception, and one additional requirement..." to the 1993 edition that are discussed in the PBAPS QATR.

RESPONSE

ASTM D3843-93 is copyright protected and a copy is available through ASTM International.

An excerpt from the PBAPS QATR (i.e., NO-AA-10, Exelon Generation Company, LLC Quality Assurance Topical Report (QATR)) describing the "clarification, exception, and one additional requirement" is provided below. This information reflects the commitment to this ASTM Standard as stated in the November 11, 1998, PBAPS response to

Generic Letter 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment." This response was accepted by the U. S. Nuclear Regulatory Commission in a letter to PBAPS dated December 1, 1999.

REFERENCE: NO-AA-10, QATR, Appendix C, Section 1.3.1, Item 3

"**3.** ASTM D3843-93, "Standard Practice for Quality Assurance for Protective Coatings applied to Nuclear Facilities."

LGS/PBAPS shall comply with ASTM D3843-93 for safety-related protective coating work in service level 1 areas during operation with the following additional clarification, exception, and requirement.

A. For coating formulations developed prior to issuance of ASTM D3843-93, service level 1 qualification based on ANSI N5.9 (Revised as ANSI N512-1974) and ANSI N101.2 remains valid.
B. Section 10.1, last sentence - instead of references to ANSI 45.2 and NQA-1, inspections will be documented for record purposes as required by 10CFR50, Appendix B, and by this QA program description.
C. Limitations on use of coatings and cleaning materials which contain elements which could contribute to corrosion, inter-granular cracking, or stress corrosion cracking of safety-related stainless steel will be followed as described in Section C.4 of Regulatory Guide 1.54, June 1973."

Attachment 8

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Response to Request for Additional Information - EVIB

Response to Request for Additional Information

Vessel and Internals Integrity 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 April 26, 2013 (NRC Accession No. ML13106A126) has requested information to clarify the submittal. The response to that request is provided below.

EVIB RAI-1

Section 2.1.1 of Attachment 4 to the application dated September 28, 2012, concerning the reactor vessel materials surveillance program, notes that PBAPS, Unit 2 contains a capsule slated to be withdrawn and tested consistent with the implementation of the Boiling Water Reactor Vessel and Internals Project (BWRVIP) Integrated Surveillance Program (ISP) (i.e, BWRVIP-86, Revision 1). Confirm that EPU conditions will not adversely impact the purpose of the capsule within the program, and/or that the appropriate BWRVIP personnel have been notified.

RESPONSE

The EPU operating conditions will not adversely impact the purpose of the material surveillance capsules within the ISP. Appropriate BWRVIP personnel (EPRI Program Manager for the Integrated Surveillance Program – BWRVIP-86) have been notified about the PBAPS EPU license amendment request.

EVIB RAI-2

Section 2.1.2 of Attachment 4 to the application dated September 28, 2012, states that beltline circumferential weld material RT_{NDT} values remain bounded by the requirements of Generic Letter (GL) 98-05, BWRVIP-05, and BWRVIP-74-A. The results supporting this statement are presented in Tables 2.1-3a and 2.1-3b. For boiling-water reactor (BWR) licensees requesting permanent relief from the inservice inspection requirements of 10 CFR 50.55a(g), for the volumetric examination of circumferential reactor pressure vessel welds, GL 98-05 required, in part, that the licensee implement operator training and establish procedures that limit the frequency of cold over-pressure events. Confirm that the licensee has implemented operator training and established procedures that limit the frequency of cold over-pressure events consistent with GL 98-05. Also confirm that the training and procedures will remain in place following implementation of the EPU and are adequate for EPU conditions.

RESPONSE

PBAPS has implemented operator training and established procedures to limit the frequency of cold over-pressure events consistent with GL 98-05. These changes / commitments were submitted to the NRC as part of "Request for Permanent Relief from Circumferential Shell Weld Inspection Requirements" per letter from James A. Hutton to USNRC (Document Control Center), dated February 7, 2000 (NRC Accession No. ML003684207), and were approved by SER dated June 15, 2000 (NRC Accession No. ML003724272). As part of implementation of the license renewal commitments, PBAPS applied for an extension of this relief request to cover the period of extended operation per letter from D. P. Helker to USNRC (Document Control Desk), dated January 24, 2011 (NRC Accession No. ML110250132). The extension for the relief request was approved by SER dated January 24, 2012 (NRC Accession No. ML112770217). In this second relief request, it was stated that the procedures and operator training to limit cold over-pressure events will be the same as those approved initially by SER dated June 15, 2000. The operator training and procedures will remain in place following implementation of the EPU. The operator training and procedures are not affected by EPU and are adequate for EPU operating conditions.

EVIB RAI-3

Section 2.1.3 of Attachment 4 to the application dated September 28, 2012, identifies the top guide, core shroud, and core plate as potentially being susceptible to irradiation-assisted stress-corrosion cracking (IASCC) at end-of-life. Provide the following information regarding inspection of the core plate and top guide:

Core Plate

a. Are lateral-restraint wedges installed or has an analysis of the hold-down bolts been conducted for the PBAPS, Units 2 and 3 core plates?

b. If an analysis of the hold-down bolts has been conducted, provide details of the analysis.

c. If lateral-restraint wedges are installed, or an analysis of hold-down bolts has been conducted, are inspections following BWRVIP-25, "BWR Core Plate Inspection and Flaw Evaluation Guidelines," still planned?

Top Guide

a. Have BWRVIP-26-A, "BWR Top Guide Inspection and Flaw Evaluation Guidelines," inspections conducted to date identified any cracking in top guide grid beams at PBAPS, Units 2 and 3?

b. In addition, confirm that PBAPS, Units 2 and 3 are following the inspection schedules outlined in BWRVIP-183, "Top Guide Grid Beam Inspection and Flaw Evaluation Guidelines," or describe the inspection programs implemented to address multiple top guide grid beam failures.

RESPONSE

The information requested regarding inspection of the core plate and top guide is provided below:

Core Plate

a. PBAPS Units 2 and 3 do not have lateral restraint wedges installed. An analysis of the core plate hold-down bolts that is applicable to the PBAPS Units 2 and 3 core plates has been performed.

b. An assessment of the minimum number of core plate bolts required to resist lateral movement against seismic shear loads has been performed, and is applicable to both PBAPS Units 2 and 3. For each unit, the minimum number of bolts required in the faulted condition, without taking credit for the integrity of the aligner pins, is eighteen (18), which results in a margin of 89% of allowable stresses (total 34 bolts installed).

c. Rather than following the guidance contained in BWRVIP-25, BWR Core Plate Inspection and Flaw Evaluation Guidelines, PBAPS has implemented an alternate inspection strategy. A VT-3 inspection of a sample of the core plate bolts is performed from above the core plate (Program Procedure ER-PB-331-1001), consistent with Reference 1. This interim inspection strategy is acceptable until December 31, 2015 or until the NRC approves revised BWRVIP guidance.

   References:

   1. Letter No. RS-11-053, S. E. Kuczynski (Exelon) to USNRC, "Deviation from BWR Vessel and Internals Project (BWRVIP) Guideline - Inspection of the Core Plate Bolts," dated March 31, 2011 (NRC Accession No. ML110910333)

Top Guide

a. Inspections of the top guide have been conducted at PBAPS Units 2 and 3 in accordance with the guidelines of BWRVIP-26-A, BWR Top Guide Inspection and Flaw Evaluation Guidelines, as well as the recommendations of GE Service Information Letter (SIL) 554 and SIL-588. No indications in the top guide grid beams have been identified to date.

b. Exelon maintains an inspection program implementing the BWRVIP recommendations at PBAPS Units 2 and 3 (Program Procedures ER-PB-331-1001, -1002, and -1003). The inspection schedules are fully compliant with BWRVIP-183, Top Guide Grid Beam Inspection and Flaw Evaluation Guidelines.

EVIB RAI-4

Section 2.1.3 of Attachment 4 to the application dated September 28, 2012, states that PBAPS, Units 2 and 3 utilize hydrogen water chemistry. Confirm that water chemistry conditions are maintained utilizing BWRVIP-190, "BWR Water Chemistry Guidelines."

RESPONSE

PBAPS Units 2 and 3 water chemistry conditions are maintained using EPRI BWR Water Chemistry Guidelines (BWRVIP-190) as described in Section 4.2.1, Water Chemistry Control, of Peach Bottom Procedure ER-PB-331-1001, *Peach Bottom Reactor Pressure Vessel & Internals Program Basis and Implementation Document.*

Attachment 9

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Affidavit in Support of Request to Withhold Information

Note

Attachment 5 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, James F. Harrison, state as follows:

(1) I am the Vice President Fuel Licensing 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-412, "GEH Response to NRC RAIs EICB-1 and EICB-2," dated May 16, 2013. The GEH proprietary information in Enclosure 1, which is entitled "GEH Response to RAIs EICB-1 and EICB-2 GEH Proprietary Information-Class III (Confidential)" is identified by a dark red dotted underline inside double square brackets. [[This sentence is an example.{3}]]. Figures containing GEH proprietary information are identified with double square brackets before and after the object. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit that 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.2.d 871 (D.C. Cir. 1992), and Public Citizen Health Research Group v. FDA, 704 F.2.d 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 GEH or 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, that may include potential products of 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 the 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 results of an analysis performed by GEH to support the Peach Bottom Atomic Power Station Extended Power Uprate (EPU) license application. This analysis is part of the GEH EPU methodology. Development of the EPU methodology and the supporting analysis techniques and information, and their application to the design, modification, and processes were achieved at a significant cost to GEH.

The development of the evaluation methodology along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GEH asset.

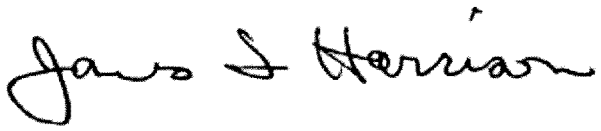
(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value 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 16th day of May, 2013.



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Attachment 10

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Response to Request for Additional Information - EICB – non-proprietary

Response to Request for Additional Information

Instrumentation & Controls 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 April 26, 2013 (NRC Accession No. ML13106A126) has requested information to clarify the submittal. The response to that request is provided below.

EICB RAI-1

In Section 3.1.12, "Primary Containment Isolation Instrumentation (TS Section 3.3.6.1)," of Attachment 1 to the application dated September 28, 2012, the second bullet describes the allowable value (AV) change to the Main Steam Line (MSL) Flow - High function. The proposed EPU would change the AV from ≤ 123.3 pounds per square inch differential (psid) to ≤ 173.8 psid. Table 2.4-1 in Attachment 4 to the application identifies the change to the MSL High Flow Isolation analytical limit (AL) in terms of % rated steam flow. Specifically, the proposed EPU would change the AL from 137.77% rated steam flow to 140% rated steam flow. However, the application does not describe how the change to the AL modified the AV, and thus how these values are related. Please provide a summary calculation that traces the change in AL (in terms of % rated steam flow) to the change in AV (in terms of psid).

RESPONSE

Methodology:

The setpoint methodology described in Reference 1-1 was used for this setpoint function to obtain the new Allowable Value (AV) for EPU conditions. [[

]] The change in the AL from current licensed conditions to EPU conditions was determined, in units of percent rated Main Steam Line (MSL) flow rate. Then, [[ ]]

Calculations:

The following steps were used to trace the changes in the AL (in terms of % rated MSL Flow rate) to the change in AV (in terms of PSID across the MSL flow restrictor):

1. The methods defined in Reference 1-2 (compressible fluids) and Reference 1-3 were used to convert the current (i.e., pre-EPU) AL and AV in units of

differential pressure (i.e., PSID) to % rated MSL Flow rate. (Current rated MSL Flow rate is approximately 3.597 Mlbm/hour.)

2. For EPU conditions, an AL of 140% Rated MSL Flow rate was selected, as indicated in Table 2.4-1 in Reference 1-4.
3. The change in AL is determined. It was an increase of 2.46 % rated MSL Flow rate, as shown in Table 1-1.
4. [[

]]

5. The methods defined in Reference 1-2 and Reference 1-3 were used to convert the EPU AL and AV in units of % rated MSL Flow rate to PSID. (EPU rated MSL Flow rate is approximately 4.043 Mlbm/hour.)

The results are shown in Table 1-1.

Table 1-1 MSL High Flow Group 1 Isolation for pre-EPU and EPU Conditions

	Current		EPU	
	PSID	**% Rated MSL Flow rate**	**PSID**	**% Rated MSL Flow rate**
AL	126.8	137.77 (1) 137.54 (calculated)	179.23	140
AV	123.3	135.97	173.81 (2)	138.43
Delta AL		140 - 137.54 = **2.46** % Rated MSL Flow rate		

(1) The AL of 137.77% Rated MSL Flow rate referenced in LAR Attachment 4, Table 2.4-1 (current conditions) was calculated during the Thermal Power Optimization/Measurement Uncertainty Recovery (TPO/MUR) project by taking the ratio of the pre-TPO/MUR and post-TPO/MUR (i.e., pre-EPU) core thermal power values and multiplying by the AL at pre-TPO/MUR (i.e., 140 % Rated MSL Flow rate) conditions. Alternatively, when converting the AL in units of differential pressure (i.e., 126.8 PSID) to % Rated MSL Flow rate using Ref. 1-3, a more precise value is achieved (i.e., 137.54%). Therefore, the latter of the two methods was used to determine the Current AL in % rated MSL Flow rate.

(2) The EPU AV was rounded to 173.8 PSID for revising the PBAPS Technical Specifications.

References

1-5. GE Nuclear Energy, "Constant Pressure Power Uprate," NEDC-33004P-A, Revision 4, July 2003.

1-6. American Society of Mechanical Engineers (ASME) Research Committee, Fluid Meters, 6th Edition, 1971.

1-7. GE Nuclear Service Information Letter (SIL) 438 Revision 1, dated May, 1994 "Main Steam Line High Flow Trip Setting."

1-8. Letter from K. F. Borton (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "License Amendment Request – Extended Power Uprate," dated September 28, 2012. (ML122860201), Attachments 4 and 6.

EICB RAI-2

By letter dated February 8, 2013 (ADAMS Accession No. ML13042A096), GE Hitachi Nuclear Energy (GEH) submitted information to the NRC concerning a potential non-conservatism in the calculation of MSL choked flow rates. Specifically, GEH had recently discovered that some calculations of choked flow rates in the MSLs of boiling-water reactors were non-conservative, with potential effects on margins between choked flow conditions and existing MSL high-flow ALs, AVs, Nominal Trip Setpoints (NTSPs), and other setpoint values based on the AL. Please explain how the information provided by GEH in its letter dated February 8, 2013, affects the PBAPS EPU calculations for MSL High Flow.

RESPONSE

GEH has evaluated PBAPS for the issue identified in the GEH Letter dated February 8, 2013 (ADAMS Accession No. ML13042A096, Reference 2-1.) To address this issue, GEH established a new, more-accurate calculation method for Main Steam Line (MSL) two-phase steam flow, [[

]] This updated calculation was used to evaluate the choked flow rate and the associated MSL flow-instrument pressure drop for PBAPS EPU conditions.

Specific values determined for PBAPS at EPU conditions, including comparison of the flow-instrument pressure drop used as the MSL high-flow Isolation Analytical Limit (AL), are provided in Table 2-1 below. Results from the prior method and the method used after resolution of the issue identified in Reference 2-1 are provided in Table 2-1 for comparison.

As shown in Table 2-1, the results of the calculation with the method used after the resolution of the issue identified in Reference 2-1 show a lower choked flow value (in percent EPU rated steam flow) and a subsequent reduction in margin between choked

flow and the MSL high-flow Isolation AL (in percent EPU rated steam flow). However, this 17% margin in percent EPU rated steam flow, using the revised method, remains adequate to ensure that the MSL high flow instrument will perform its trip function prior to reaching choked flow conditions. The evaluation also determined that for the selected AL of 140% EPU rated flow the corresponding instrument reading [[ ]] is greater than by the previous method. Thus, the previous value in psid is conservative and can be retained. Moreover, this AL in psid has considerably more margin to the choked flow condition than the GEH recommended minimum margin, as shown in the bottom two lines of Table 2-1.

Based on results from a revised and more accurate calculation of MSL flow and flow-instrument pressure drop, the condition described in Reference 2-1 has no impact on the function of the PBAPS MSL high-flow instrument trip at EPU conditions. The PBAPS MSL flow-instrument trip will actuate the trip function prior to attaining choked flow in the MSL. There is no change to the information presented in Section 2.4.1.3.1 of Reference 2-2.

Table 2-1 - Revised Values of Choked Flow Rate

Item	Operating Conditions	EPU Previous Method(1)	EPU Revised Method(2)
1	Choked Flow Rate (Mlb_m/hr)	6.926	6.349
2	Choked Flow Rate (% EPU Rated Flow)	171	157
3	Flow Instrument Pressure Drop at Choked Conditions (psid)	371	400
4	MSL High-Flow Isolation AL (% EPU Rated Steam Flow)	140	140
5	MSL Choked Flow-to-AL Flow Margin (% EPU rated steam flow) (Item 2 minus Item 4)	31	17
6	MSL High-Flow Isolation AL (psid)	179.23	>179.23(3)
7	GEH Recommended Choked Flow-to-AL Margin (psid)	[[ ]]	[[ ]]
8	MSL Choked Flow-to-AL Flow Margin (psid) (Item 3 minus Item 6)	191.77	220.77

(1) Method prior to corrections for the Part 21 Notification (Reference 2-1)

(2) Method after corrections for the Part 21 Notification (Reference 2-1)

(3) For the AL of 140% rated EPU flow, the revised method provides an instrument psid reading which is larger than 179.23 psid determined by the former method. However, retention of this AL psid value (179.23 psid), as elected by EGC, is conservative since it will result in the instrument performing its safety function with a lower developed differential pressure. Moreover, the AL to choke flow margin (in psid) remains significantly greater than the minimum required margin. Note that an AL (in psid) greater than the value reported here can be supported as long as the choke flow-to-AL margin is greater than the value shown in Item 7.

References

2-3. GE Hitachi Nuclear Energy letter to U.S. Nuclear Regulatory Commission, MFN 12-111, Revision 2, Completed Evaluation of Part 21 Potentially Reportable Condition Notification: Error non-conservatism in the calculation of Main Steam Line choked flow rates calculational methodology, February 8, 2013 (ADAMS Accession No. ML13042A096).

2-4. Letter from K. F. Borton (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "License Amendment Request – Extended Power Uprate," dated September 28, 2012. (ML122860201), Attachments 4 and 6.