Exelon Generation®

10 CFR 50.90
10 CFR 2.390

June 4, 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 4
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)
3. Exelon letter to the NRC, "License Amendment Request - Extended Power Uprate – Supplement 3," dated May 24, 2013

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 provided the Requests for Additional Information (RAI) from eight NRC review branches. The EGC response to those RAIs, with the exception of three questions from the Electrical Engineering Branch, was provided in Reference 3.

This letter addresses the remaining questions from Reference 2.

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.

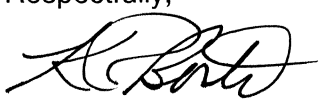
In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the Commonwealth of Pennsylvania and the State of Maryland of this application by transmitting a copy of this letter along with the non-proprietary attachments to the designated State Officials.

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 4th day of June.

Respectfully,



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

Attachment:
1. Response to Request for Additional Information – EEEB

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 – 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 responses to questions 4 through 15 were submitted on May 24, 2013. Additional time was requested to provide the responses to EEEB questions 1 through 3. The responses to those questions are provided below.

EEEB RAI-1

In Table 2.3-1 of Attachment 4 to the application dated September 28, 2012, the licensee provides the normal, design-basis accident (DBA) and total radiation requirements for rooms at PBAPS. For the environmental qualification (EQ) zones/areas, provide, in table form, a list of components and their respective qualification levels and parameters (i.e., temperature, pressure, humidity, chemical spray, submergence, and radiation) that shows that the EQ limits remain bounding under EPU conditions for normal operation, accident (loss-of-coolant accident (LOCA), main steam line break (MSLB)/high-energy line break (HELB)), and post-accident. Include the existing EQ limits in your response and show how EQ margins (e.g., temperature, pressure, radiation, etc.) are being maintained. Provide more detail with regard to the statement made on page 2-124 of Attachment 4 to the application dated September 28, 2012, about the margin evaluation complying with the Institute of Electrical and Electronics Engineers (IEEE) 323-1974 (Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations).

RESPONSE

Table 1 summarizes the changes to EQ environmental parameters due to EPU. Changes are discussed in more detail below.

Table 1
Summary of EPU Impact on EQ DBA Environmental Parameters (Note 1)

Environmental Parameter	IMPACT OF EPU	
	Inside Containment	Outside Containment
Temperature, Normal	No change	No change
Radiation, Normal	Increased by scaling factor of 1.1423	Increased by scaling factor of 1.1423
Temperature, Accident	No change in peak temperature (340°F); change to post-DBA temperature profile described below	No change except for RWCU rooms (Note 2)
Pressure, Accident	Changed from 47.8 to 48.7 psig	No change
Humidity, Accident	No change	No change
Spray, Accident	No Change	N/A
Submergence, Accident	No Change	No change
Radiation, Accident	Increased by scaling factor of 1.1423	Increased by scaling factor of 1.1423

Notes:

1) 'Accident' means loss of coolant accident (LOCA), main steam line break (MSLB), or high energy line break (HELB), as applicable to each area.
2) During the reviews performed for EPU a deficiency was noted in the RWCU HELB analysis. The RWCU HELB analysis was therefore re-performed using bounding values that enveloped both current (pre-EPU) and EPU operating conditions. Table 3 shows that the equipment qualification limit bounds the DBA peak temperature in these rooms.

DBA Temperature inside Containment

Figure 2.3-1 of Attachment 4 to the application shows the current Drywell EQ temperature profile and revised EPU Drywell temperature profile for 101 days post-accident. The profiles differ only during the first three hours where the EPU profile duration at peak temperature of 340°F increased. All equipment and commodities have been re-evaluated and remain qualified for the EPU Drywell temperature profile. The EPU EQ temperature evaluation does not affect the Current Licensed Thermal Power (CLTP) margins. EPU does not affect the peak temperature requirement and therefore, the EQ temperature margins at CLTP conditions are maintained.

DBA Pressure inside Containment

Figure 2.6-6 of Attachment 4 to the LAR application shows the bounding EPU drywell pressure profile. Peak pressure increased from 47.8 psig (62.5 psia) to 48.7 psig (63.4 psia). All equipment and commodities were re-evaluated with respect to the EPU peak pressure of 48.7 psig. The evaluation determined that EQ qualification post-EPU was maintained and the remaining margins exceeded the required IEEE-323-1974, 10% margin. Table 2 shows that the qualification limit bounds the postulated accident pressure with sufficient margin.

Table 2: Evaluation of Pressure Qualification of EQ Equipment and Commodities in the Drywell

Equipment	Qualification Limit [psig]	Margin (Note 1)
AVCO Solenoid Valves	62	27%
NDT International Acoustic Monitors	61.3	25%
PYCO RTDs and Thermocouples	115	136%
Pyle National Plug Connectors	105	115%
General Atomic Radiation Detectors	77	58%
GE Electrical Penetrations	124	154%
Buchanan Terminal Blocks	113	132%
GE Terminal Blocks	103	111%
Weidmuller Terminal Blocks	113	132%
Amp Terminal Lugs	74	51%
GE SIS Cable	104	113%
ITT Surprenant Power Cable	113	132%
Okonite Power Cable	112	129%
Rockbestos Cable	105	115%
Patel Conduit Seals	100	105%
H2/O2 Analyzer	68	39%
EGS Grayboot Connectors	81	66%
Insulated Splices (Raychem Kits)	66	35%
EGS Quick Disconnects	77	58%
Limitorque Motor Operated Valves	79.1	62%
Namco Position Switches	70	43%
ASCO Solenoid Valves, Trip Coils, and Pressure Switches	110	48%
UCI Electrical Tape	62	27%
Brand-Rex Cable	100	105%

Notes:

1) Margin is calculated based on gauge pressure relative to the modified EQ pressure requirement of 48.7 psig (63.4 psia).

DBA Temperature Outside Containment

Because the PBAPS EPU is a constant pressure EPU, the consequences of postulated HELBs remains unchanged. However, during the reviews performed for EPU, a deficiency was noted in the RWCU HELB analysis. The RWCU HELB analysis was therefore re-performed using bounding values that enveloped both current (pre-EPU) and EPU operating conditions. Table 3 identifies the rooms with EQ equipment impacted by an RWCU HELB and presents both the peak EPU accident (HELB) temperature and the qualification temperature limit for EQ equipment and commodities located in the room. Table 3 shows that the qualification limit bounds the postulated accident temperature.

Table 3-LOCA/HELB Temperature Evaluation Outside Containment

Room Number	Room Name	Qualification Limit (°F)	Peak EPU Accident Temperature (°F)
400 (Unit 2)	RWCU Valve Compartment	340	213
403 (Unit 2)	Operating Area	207	177
444 (Unit 3)	Operating Area	207	177
447 (Unit 3)	RWCU Valve Compartment	340	213

Radiation Environment Inside & Outside Containment

Table 4 identifies each type of equipment and commodity included in the PBAPS EQ Program along with the EPU EQ total integrated dose (TID) for relevant plant locations and the qualification limit. The EPU EQ TID is the sum of the normal dose, accident dose, and 10% margin on accident dose (in accordance with IEEE-323-1974 recommendations). The difference between the qualification limit and the EPU EQ TID reflects available excess margin. Table 4 shows that all equipment and commodities remain qualified for EPU operating conditions.

Table 4: Evaluation of Radiation Qualification of EQ Equipment and Commodities

Equipment	Rooms (Note 1)	EPU EQ TID [rads] (Note 2)	Qualification Limit [rads]
AVCO Solenoid Valves (U02, U06, and U14 series)	PC/OC	1.50E+08	1.56E+08
AVCO Solenoid Valves (models 6910-010, 6910-020, C-54505 only)	PC/OC	8.73E+07	1.07E+08
Rosemount Trip Units	OC	1.02E+05	2.20E+05
Rosemount Pressure Transmitters (Model 1153B)	OC	3.88E+06	2.62E+07
GE Control Station	OC	1.14E+07	3.9E+07
Agastat Relays	OC	1.02E+05	2.0E+05
Static-O-Ring Pressure Switches	OC	3.90E+06	1E+07
Cutler Hammer MCC	OC	2.89E+05	1.4E+06
NDT International Acoustic Monitors	PC	1.87E+08	2.00E+08
	OC	1.02E+05	5.35E+05
Target Rock Solenoid Valves (76EE series only)	OC	2.90E+05	2.27E+07
Target Rock Solenoid Valves	OC	4.48E+07	4.80E+07
PYCO RTDs and Thermocouples	PC	1.92E+08	2.2E+08
	OC	4.36E+07	1E+08
ITT Barton Differential Pressure Switches (580A/583A series only)	OC	4.36E+07	5.00E+07
ITT Barton Differential Pressure Switches (Model 764/352 only)	OC	4.36E+07	5.0E+07
ITT Barton Differential Pressure Switches (Models 288/ 289A only)	OC	1.37E+05	3.0E+06

Equipment	Rooms (Note 1)	EPU EQ TID [rads] (Note 2)	Qualification Limit [rads]
Atkomatic Solenoid Valves	OC	2.12E+06	2.68E+06
Reliance ECCS Fan Motors	OC	4.36E+07	1.0E+08
Brown Boveri Load Centers	OC	2.89E+05	1E+06
Valcor Solenoid Valves	OC	4.27E+07	5.9E+07
GE Radiation Elements	OC	1.68E+03	1.7E+05
General Atomic Radiation Detectors	PC	1.92E+08	2.0E+08
GE Electrical Penetrations	PC	8.70E+07	1E+08
Foxboro Pressure Transmitters	OC	2.90E+05	3.0E+06
HPCI System Equipment	OC	6.89E+06	8E+06
Masoneilan Electropneumatic Transducer	OC	1.95E+06	1.12E+07
Manual Transfer Switch	OC	1.02E+05	2.9E+05
Y-Panels and Associated Transformers	OC	1.02E+05	1.2E+06
Barksdale Pressure Switch	OC	3.88E+06	4.4E+06
H2/O2 Analyzer	PC/OC Components in contact with PC air	1.92E+08	2E+08
	Components in contact with SC air	3.86E+06	6.1E+06
GE 4 kV Pump Motors & Associated Cables	OC	4.36E+07	4.6E+07 (motor) 1.0E+08 (cable)
Fuses and Fuse Holders	OC	6.89E+06	1.0E+07

Equipment	Rooms (Note 1)	EPU EQ TID [rads] (Note 2)	Qualification Limit [rads]
Limitorque Motor Operated Valves	PC/OC	1.22E+08	1.96E+08
Namco Position Switches	PC/OC	1.14E+08	2E+08
ASCO (Solenoid Valves and Trip Coils only)	PC/OC	1.50E+08	2.00E+08
ASCO (Pressure Switches only)	OC	4.27E+07	2.0E+08
Pyle National Plug Connectors (Note 3)	PC	1.92E+08	2.0E+08
Buchanan Terminal Blocks (Model NQB, Series 100) (Note 3)	PC	1.94E+08	2.0E+08
Buchanan Terminal Blocks (Models 416 and 430) (Note 3)	OC	2.89E+05	3E+05
GE Terminal Blocks (Note 3)	PC	1.92E+08	2.2E+08
Marathon Terminal Blocks (Note 3)	OC	4.48E+07	2.5E+09
Weidmuller Terminal Blocks (Note 3)	PC	1.42E+08	2.0E+08
Amp Terminal Lugs (Note 3)	PC	1.92E+08	2.59E+08
Scotch Insulating Tape (Note 3)	OC	4.36E+07	6.2E+07
GE SIS Cable (Note 3)	PC/OC	1.00E+08	1E+08
ITT Surprenant Power Cable (Note 3)	PC	1.92E+08	2.56E+08
Okonite Power Cable (Note 3)	PC	1.92E+08	2.0E+08
Rockbestos Cable (Firewall III) (Note 3)	PC	1.17E+08	2.0E+08
Rockbestos Cable (coaxial cable, Pyrotrol, and SR) (Note 3)	PC	1.94E+08	2.0E+08
Patel Conduit Seals (Note 3)	PC	1.94E+08	2.0E+08

Equipment	Rooms (Note 1)	EPU EQ TID [rads] (Note 2)	Qualification Limit [rads]
Jefferson Coaxial Cable (Note 3)	OC	1.05E+07	2E+08
Anaconda Instrument and Power Cable (Note 3)	OC	2.89E+05	3.0E+07
EGS Grayboot Connectors (Note 3)	PC	2.05E+08	2.08E+08
Insulated Splices (Raychem Kits, NMCK-8 only) (Note 3)	OC	4.48E+07	5E+07
Insulated Splices (Raychem Kits except NMCK-8) (Note 3)	PC	1.92E+08	2.0E+08
EGS Quick Disconnects (Note 3)	PC	1.92E+08	2.0E+08
UCI Electrical Tape (Note 3)	PC	1.92E+08	2.0E+08
Brand-Rex Cable (Note 3)	PC	1.92E+08	2E+08

Notes:
1) 'PC' indicates primary containment. 'OC' indicates Outside Primary Containment. 'SC' indicates Secondary Containment
2) The EPU EQ TID is the sum of the normal dose, accident dose, and 10% margin on accident dose.
3) Items marked by this note are commodity items that are qualified for various plant areas based on the worst-case location (either Drywell, worst-case Reactor Building room having EQ equipment, or specific applications).

Margin

The EPU EQ evaluation applied the IEEE-323-1974 margin recommendations for relevant environmental parameters. The recommended margins (10%) on pressure and accident dose are specifically accounted for as discussed previously. The EQ evaluation applied IEEE-323-1974 recommended temperature margin of either +15°F degree or other alternate means. The EPU EQ evaluation applied a 10% margin to the post accident operating time.

Conclusion:

EQ for safety related electrical equipment is based on MSLB outside containment, HELB and /or LOCA conditions and their resultant temperature, pressure, humidity, submergence and radiation consequences. All equipment remains qualified for post EPU parameters.

EEEB RAI-2

On page 2-124 of Attachment 4 to the application dated September 28, 2012, the licensee states that limited life components (less than 60 years) are addressed within the PBAPS EQ program as warranted. Provide a list of all EQ Program equipment that will have a limited life due to increase in temperature, pressure, humidity, and radiation at EPU conditions. Confirm that there is no EQ equipment that needs to be replaced prior to EPU implementation.

RESPONSE

There is no equipment that will have a limited life due to increase in temperature, pressure, humidity, radiation at EPU conditions. There is no EQ equipment that needs to be replaced prior to EPU implementation. The environmental qualification of EQ equipment is not impacted by EPU changes.

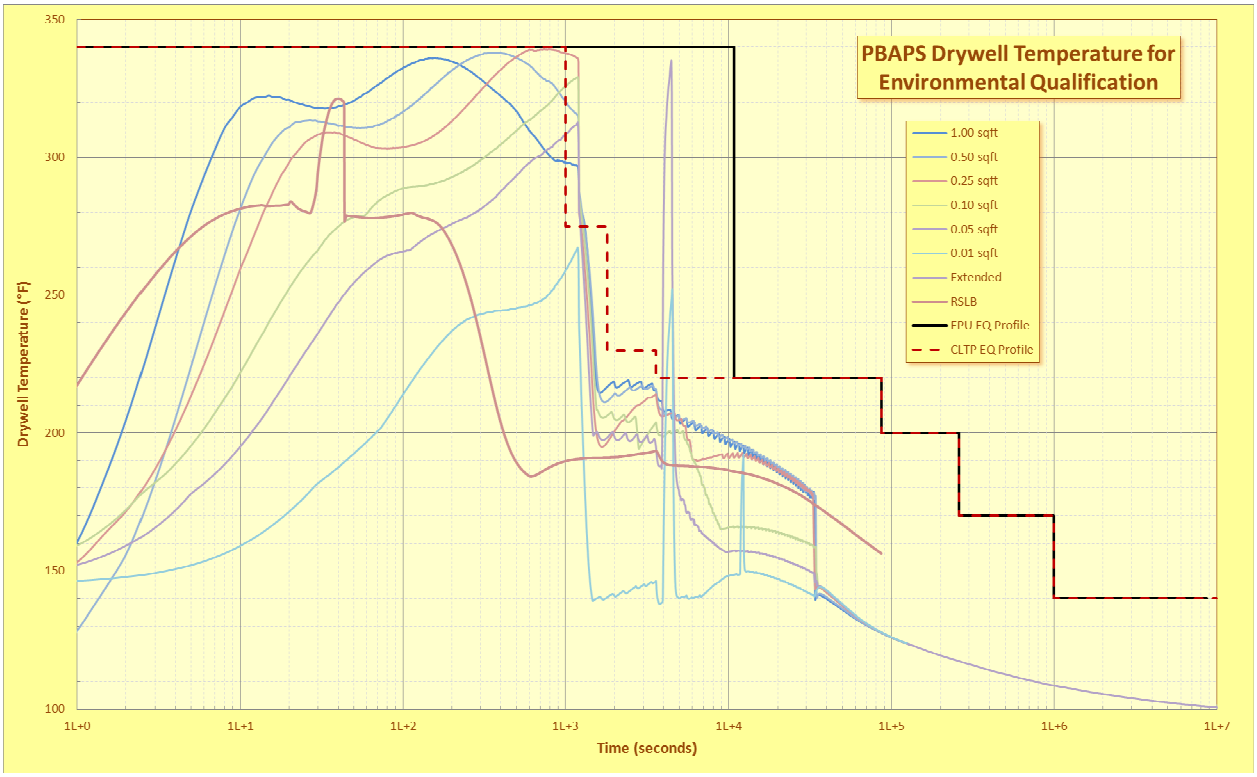
EEEB RAI-3

In Figure 2.3-1 of Attachment 4 to the application dated September 28, 2012, the licensee presented the current EQ temperature profile and revised post-EPU EQ temperature profile, for the drywell (DW). Update this profile for the equipment to show that the equipment remains qualified for the temperature in the DW under EPU conditions. Provide a containment LOCA/MSLB Accident Pressure profile curve vs. the plant EQ profile.

RESPONSE

Drywell Temperature Profile:

The Small Steam Line Break (SSLB) is the limiting event for DW temperature. The figure below provides the composite profile of PBAPS SSLB drywell temperature and the bounding EQ temperature profile. The only impact of the EPU on the EQ temperature profile was an increase in the duration of the peak temperature. This impact was evaluated as described in response to EEEB RAI-1 above. The results of the EQ evaluation concluded that the environmental qualification of EQ equipment was not impacted by EPU and therefore remains qualified for post–EPU operation. The SSLB temperatures profiles are also shown in Figure 2.6-10 of Attachments 4 and 6 of the PBAPS EPU LAR.



Drywell Peak Pressure:

As was discussed in the NRC-EGC clarification call on April 17, 2013, the response provides the limiting component relative to peak DW pressure. Figure 2.6-6 of Attachments 4 and 6 of the PBAPS EPU LAR show the bounding EPU DW pressure profile. Peak DW pressure increased from 47.8 psig to 48.7 psig as shown in the Figure 2.6-6 and Table 2.6-1 of Attachments 4 and 6 of the PBAPS EPU LAR. As discussed above in the response to EEEB RAI-1 above, all equipment and commodities were evaluated with respect to the EPU peak pressure and remain qualified for post EPU operation. The lowest qualification peak pressure for any EQ component is 61.3 psig and the associated margin is 25%. This exceeds the 10% margin to peak pressure recommended by IEEE-323-1974.