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PROPRIETARY INFORMATION – WITHHOLD UNDER 10 CFR 2.390

10 CFR 50.90
10 CFR 2.390

February 15, 2013

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

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

Subject: Supplemental Information and Corrections Supporting Request for License Amendment Request - Extended Power Uprate – Supplement No. 1

References:
1. 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)
2. Letter from R. B. Ennis (U. S. Nuclear Regulatory Commission) to M. J. Pacilio, (Exelon Generation Company, LLC), "Peach Bottom Atomic Power Station, Units 2 and 3, Supplemental Information Needed for Acceptance of Requested Licensing Action Re: Extended Power Uprate (TAC Nos. ME9631 and ME9632)," dated December 18, 2012

In Reference 1, Exelon Generation Company, LLC (EGC) requested an amendment to Facility Operating License Nos. DPR-44 and DPR-56 for Peach Bottom Atomic Power Station, Units 2 and 3, respectively. Specifically, the proposed changes revise the Operating License and Technical Specifications to implement an increase to 3951 MWt from the current licensed reactor thermal power (CLTP) of 3514 MWt. In Reference 2, the U. S. Nuclear Regulatory Commission staff requested supplemental information for three (3) issues to enable the staff to make an independent assessment regarding the acceptability of the proposed amendment request.

This letter provides the U. S. Nuclear Regulatory Commission with the requested supplemental information for the three issues described in Reference 2. Additionally, corrections to information provided in Reference 1 are provided in Attachment 8.

Attachments 5 and 9 transmitted herewith contain Proprietary Information. When separated from Attachments 5 and 9, this document is decontrolled.

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Attachments 1 through 12 include the responses and corrections and are summarized below.

Attachments 1 through 3, Safety Evaluation Template

Attachment 1 contains a restatement of and response to Issue 1 – Safety Evaluation Template. In Issue 1, the NRC requested a Safety Evaluation (SE) template based on RS-001, "Review Standard for Extended Power Uprates," that is consistent with the PBAPS, Units 2 and 3, design basis. Attachment 2 provides a redline/strikeout version of the Safety Evaluation Template for PBAPS, Units 2 and 3. Attachment 3 provides a clean version of the Safety Evaluation Template for PBAPS, Units 2 and 3. Attachments 2 and 3 modify each of the "Regulatory Evaluation" and "Conclusion" paragraphs in the Evaluation portion of the SE template. An electronic copy of the SE template, in electronic format (Microsoft Word), is provided to the USNRC Project Manager on a CD. This information supersedes the General Design Criteria (GDC) information contained in the Regulatory Evaluation, Current Licensing Basis and Conclusion sections in Attachment 4 and 6, Power Uprate Safety Analysis Report (PUSAR) of Reference 1.

Attachments 4 though 7, ECCS Analysis

Attachment 4 contains a restatement of and response to Issue 3 – Emergency Core Cooling System (ECCS) Analysis. Attachment 5 provides the supplemental information requested. Attachment 5 contains a proprietary version of the GE-Hitachi Nuclear Energy Americas LLC (GEH) ECCS analysis summary Information documented in NEDC-33791P, December 2012, "Peach Bottom Atomic Power Station, Units 2 & 3, Extended Power Uprate, ECCS-LOCA Analysis Summary Information." GEH considers portions of the information provided in Attachment 5 of this response request to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. Attachment 6 is a redacted version of GEH report NEDC-33791P and has a GEH designation of NEDO-33791. An affidavit for withholding information, executed by GEH, is provided in Attachment 7. Therefore, on behalf of GEH, EGC requests to withhold Attachment 5 from public disclosure in accordance with 10 CFR 2.390(a)(4).

Attachment 8, LAR Corrections

Attachment 8 contains corrections to reference and description information related to the elimination for Containment Accident Pressure (CAP) Credit provided in Reference 1. This information is contained in Attachments 1 and 9 and Enclosures 9c, 9d and 9e to Attachment 9 of the original submittal (Reference 1). A review concluded these changes do not affect the analyses performed, or the conclusions reached regarding the elimination of CAP credit for the proposed EPU.

Attachments 9 through 12, Steam Dryer Analysis

Attachment 9 contains 1) a restatement of and response to Issue 2 – Steam Dryer Analysis, 2) the supplemental information requested, and 3) proprietary information. The U. S. Nuclear Regulatory Commission identified information that was withheld from public disclosure within Issue 2 of Reference 2 and is identified by text inside double brackets, [[This sentence is an example.]]. Westinghouse Electric Company (WEC) considers additional portions of the information provided in the response to Issue 2 to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. The WEC proprietary information in Attachment 9 is identified by underlined text inside

double brackets, [[This sentence is an example.]][a,c]. An affidavit for withholding information, executed by WEC, is provided in Attachment 11. EGC considers additional portions of the information provided in the response to Issue 2 to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. The EGC proprietary information in Attachment 9 is identified by double underlined text inside double brackets, [[This sentence is an example.]]. An affidavit for withholding information, executed by EGC, is provided in Attachment 12. Attachment 10 is a redacted version of Attachment 9 as marked by the U. S. Nuclear Regulatory Commission in Reference 2, as marked by WEC and as marked by EGC. Therefore, EGC requests to withhold Attachment 9 from public disclosure in accordance with 10 CFR 2.390(a)(4).

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 and corrections provided in this submittal do not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. In addition, the additional information and corrections provided in this submittal do 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 David B. Neff at (610) 765-5631.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 15th day of February, 2013.

Respectfully,

Kevin F. Borton
Manager, Licensing - Power Uprate

Attachments:

1. Response to Request for Supplemental Information, Issue 1, Safety Evaluation Template
2. Safety Evaluation (SE) template - redline/strikeout version
3. Safety Evaluation (SE) template – clean version
4. Response to Request for Supplemental Information, Issue 3, Emergency Core Cooling System Analysis
5. NEDC-33791P, December 2012, Peach Bottom Atomic Power Station Units 2 & 3, Extended Power Uprate, ECCS-LOCA Analysis Summary Information, GEH Proprietary Information
6. NEDO-33791, December 2012, Peach Bottom Atomic Power Station Units 2 & 3, Extended Power Uprate, ECCS-LOCA Analysis Summary Information, Non-Proprietary
7. GEH Affidavit for Withholding Information from Public Disclosure in Emergency Core Cooling System Analysis in Attachment 5
8. Corrections to PBAPS LAR Submitted September 28, 2012
9. Response to Request for Supplemental Information, Issue 2, Steam Dryer, WEC and EGC Proprietary Information
10. Response to Request for Supplemental Information, Issue 2, Steam Dryer, Non-Proprietary
11. WEC Affidavit for Withholding Information from Public Disclosure in Steam Dryer Analysis in Attachment 9
12. EGC Affidavit for Withholding Information from Public Disclosure in Steam Dryer Analysis in Attachment 9

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 Supplemental Information
Issue 1, Safety Evaluation Template

NRC Issue 1 – Safety Evaluation Template

The construction permit for PBAPS, Units 2 and 3, was issued by the Atomic Energy Commission (AEC) on January 31, 1968. As discussed in Appendix H to the PBAPS Updated Final Safety Analysis Report (UFSAR), during the construction/licensing process, both units were evaluated against the then-current AEC draft of the 27 General Design Criteria (GDC) issued in November 1965. On July 11, 1967, the AEC published, for public comment in the *Federal Register* (32 FR 10213), a revised and expanded set of 70 draft GDC (hereinafter referred to as the "draft GDC"). Appendix H of the PBAPS UFSAR contains an evaluation of the design basis of PBAPS, Units 2 and 3, against the draft GDC. The licensee concluded that PBAPS, Units 2 and 3, conforms to the intent of the draft GDC.

On February 20, 1971, the AEC published, in the *Federal Register* (36 FR 3255), a final rule that added Appendix A to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "General Design Criteria for Nuclear Power Plants" (hereinafter referred to as the "final GDC"). Differences between the draft GDC and final GDC included a consolidation from 70 to 64 criteria. As discussed in the NRC's Staff Requirements Memorandum for SECY-92-223, dated September 18, 1992 (ADAMS Accession No. ML003763736), the Commission decided not to apply the final GDC to plants with construction permits issued prior to May 21, 1971. At the time of promulgation of Appendix A to 10 CFR Part 50, the Commission stressed that the final GDC were not new requirements and were promulgated to more clearly articulate the licensing requirements and practice in effect at that time. Each plant licensed before the final GDC were formally adopted, was evaluated on a plant-specific basis, determined to be safe, and licensed by the Commission.

The licensees for PBAPS, Units 2 and 3, have made changes to the facility over the life of the plant that may have invoked the final GDC. The extent to which the final GDC have been invoked can be found in specific sections of the UFSAR and in other plant-specific design and licensing basis documentation.

The NRC staff's review schedule for an EPU request is based on using the guidance contained in RS-001, "Review Standard for Extended Power Uprates" (ADAMS Accession No. ML033640024). The staff intends to use the safety evaluation (SE) template contained in Section 3.2 of RS-001 (i.e., template for boiling-water reactors) to generate the plant-specific SE for the PBAPS EPU review.

The SE template in RS-001 is based on a plant designed to the final GDC. As such, considerable effort would need to be expended by the NRC staff to modify the template, such that it reflects the design basis for PBAPS. As discussed in Section 2.1 of RS-001, licensees are encouraged to provide, with their EPU applications, markups of the SE template to identify any differences between the review standard and the design bases of their plants. The review standard states "[t]his should avoid potential delays and improve the efficiency of the staff's review."

Based on the above, the licensee is requested to provide a supplement to the EPU application that includes the following:

a) A redline/strikeout version of the SE template, as shown in Section 3.2 of RS-001, which modifies each of the "Regulatory Evaluation" and "Conclusion" paragraphs in the technical evaluation portion of the SE (i.e., SE Section 2.0, "Evaluation"), consistent with the PBAPS, Units 2 and 3, design basis.

b) A clean version of the SE template, incorporating all the redline/strikeout changes. The clean version should be provided in hard copy as well as electronic format (Microsoft Word).

Response

The requested information is provided in this supplement. Attachment 2 contains a redline/strikeout version of the SE template, as shown in Section 3.2 of RS-001, which modifies each of the "Regulatory Evaluation" and "Conclusion" paragraphs in the Evaluation section of the SE template (i.e., SE Section 2.0, "Evaluation"), consistent with the PBAPS, Units 2 and 3, design basis.

Attachment 3 contains clean version of the SE template, incorporating all the redline/strikeout changes in hard copy form.

An electronic copy of the SE template in electronic format (Microsoft Word) is provided to the USNRV Project Manager on a CD.

This information reflects the PBAPS plant design basis as it applies to the applicable General Design Criteria (GDC). As such, it can be used by the NRC staff to generate the plant-specific SE for the PBAPS EPU review. This information supersedes the GDC information contained in the Regulatory Evaluation, Current Licensing Basis and Conclusion sections contained in Attachments 4 and 6 of the Peach Bottom Atomic Power Station, Units 2 and 3 License Amendment Request - Extended Power Uprate, dated September 28, 2012.

Based on the above, the licensee is requested to provide a supplement to the EPU application that includes the following:

a) A redline/strikeout version of the SE template, as shown in Section 3.2 of RS-001, which modifies each of the "Regulatory Evaluation" and "Conclusion" paragraphs in the technical evaluation portion of the SE (i.e., SE Section 2.0, "Evaluation"), consistent with the PBAPS, Units 2 and 3, design basis.

b) A clean version of the SE template, incorporating all the redline/strikeout changes. The clean version should be provided in hard copy as well as electronic format (Microsoft Word).

Response

The requested information is provided in this supplement. Attachment 2 contains a redline/strikeout version of the SE template, as shown in Section 3.2 of RS-001, which modifies each of the "Regulatory Evaluation" and "Conclusion" paragraphs in the Evaluation section of the SE template (i.e., SE Section 2.0, "Evaluation"), consistent with the PBAPS, Units 2 and 3, design basis.

Attachment 3 contains clean version of the SE template, incorporating all the redline/strikeout changes in hard copy form.

An electronic copy of the SE template in electronic format (Microsoft Word) is included in the submittal package on a CD.

This information reflects the PBAPS plant design basis as it applies to the applicable General Design Criteria (GDC). As such, it can be used by the NRC staff to generate the plant-specific SE for the PBAPS EPU review. This information supersedes the GDC information contained in the Regulatory Evaluation, Current Licensing Basis and Conclusion sections contained in Attachments 4 and 6 of the Peach Bottom Atomic Power Station, Units 2 and 3 License Amendment Request - Extended Power Uprate, dated September 28, 2012.

Attachment 4

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Response to Request for Supplemental Information
Issue 3, Emergency Core Cooling System Analysis

NRC Issue 3 - Emergency Core Cooling System Analysis

The "Executive Summary" in Attachment 4 to the application dated September 28, 2012, discusses the approach used for the PBAPS EPU. The summary states, in part, that:

> GE-Hitachi Nuclear Energy Americas LLC (GEH) has previously developed and implemented Extended Power Uprate (EPU) at several nuclear power plants. Based on EPU experience, GEH developed an approach to uprate reactor power that maintains the current plant maximum normal operating reactor dome pressure. This approach is referred to as Constant Pressure Power Uprate (CPPU) and was approved by the Nuclear Regulatory Commission (NRC) in the Licensing Topical Report (LTR) NEDC-33004P-A, Revision 4, "Constant Pressure Power Uprate," hereafter referred to as the CLTR. The CLTR was approved for Boiling Water Reactor (BWR) plants containing General Electric (GE) fuel types through GE14 and using GEH accident analysis methods. PBAPS contains only GE fuel types, through and including GNF2, and this evaluation uses only GEH accident analysis methods.
>
> Because PBAPS uses GNF2 fuel, the CLTR is not applicable for fuel design dependent evaluations and the transients performed in support of the generic disposition in the CLTR are not applicable. Therefore, for fuel-dependent topics, this report follows the NRC-approved generic content for BWR EPU licensing reports, documented in NEDC-32424P-A, "Generic Guidelines For General Electric Boiling Water Reactor Extended Power Uprate," commonly called "ELTR1." Per ELTR1, every safety issue that should be addressed in a plant specific EPU licensing report is addressed in this report. For issues that have been evaluated generically, this report references the NRC-approved generic evaluations in NEDC-32523P-A, "Generic Evaluations of General Electric Boiling Water Reactor Extended Power Uprate," which is commonly called "ELTR2."

Section 2.8.5.6.2.5 of Attachment 6 to the application dated September 28, 2012, provides a discussion regarding the Emergency Core Cooling System (ECCS) performance at EPU conditions. The first paragraph of this section states that because the PBAPS EPU is based on GNF2 fuel, the ECCS analysis was based on ELTR1.

Section 5.3.1 of the ELTR, which discusses ECCS - Loss-of-Coolant Accident (LOCA) performance analyses, states, in part, that:

> ECCS-LOCA performance analyses will be performed to demonstrate that the 10 CFR 50.46 requirements continue to be met consistent with the uprate conditions (power and pressure).....A separate LOCA analysis report may be prepared and submitted before or with the uprate application.

In addition, as discussed in the February 8, 1996, letter from the NRC (Dennis M. Crutchfield) to General Electric (G.L. Sozzi), that approved ELTR1, "[t]he staff expects utilities to provide adequate analytical information to support each plant-specific extended power uprate request." Although Table 2.8-6 of Attachment 6 to the application provides a summary of the ECCS performance results for EPU, the text in Section 2.8.5.6.2.5 does not provide adequate detail to enable the NRC staff to make an independent assessment. As such, the licensee is requested to provide the ECCS analyses that were performed to support the EPU. This information should include the specific analyses related to the impact on peak cladding temperature, and any single failure evaluations performed for the automatic depressurization system.

Response

The requested detailed information regarding the ECCS analyses that were performed to support the EPU is provided in Attachment 5. Attachment 5 contains a proprietary version of the GE-Hitachi Nuclear Energy Americas LLC (GEH) ECCS analysis summary information documented in NEDC-33791P, December 2012, "Peach Bottom Atomic Power Station, Units 2 & 3, Extended Power Uprate, ECCS-LOCA Analysis Summary Information." This information includes the specific analyses related to the impact on peak cladding temperature, and any single failure evaluations performed for the automatic depressurization system. A clarification call was conducted on November 20, 2012, involving U. S. Nuclear Regulatory Commission, Exelon Generation Corporation and GEH personnel. During the call all parties agreed that the response should include the following specific information in response to the written request.

1. A discussion on the LOCA Break spectrum and selection and how the analyses arrived at the limiting case,
2. Information on the Design Basis Accident (DBA) large break and small break cases,
3. Discussion of the model used,
4. Sequence of events, and
5. Plots of transients that are used to determine the Peak Fuel Clad Temperatures (PCT).

Attachment 6 is a redacted version of GEH report NEDC-33791P and has a GEH designation of NEDO-33791.

Non-Proprietary Information – Class I (Public)

Attachment 6

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Response to Request for Supplemental Information
Issue 3, Emergency Core Cooling System Analysis

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GE Hitachi Nuclear Energy

NEDO-33791
Revision 0
DRF Section 0000-0155-8766 R2
December 2012

Non-Proprietary Information – Class I (Public)

PEACH BOTTOM ATOMIC POWER STATION UNITS 2 & 3

EXTENDED POWER UPRATE ECCS-LOCA ANALYSIS SUMMARY INFORMATION

INFORMATION NOTICE

This is a non-proprietary version of the document NEDC-33791P, Revision 0, which has the proprietary information removed. Portions of the document that have been removed are indicated by an open and closed bracket as shown here [[ ]].

IMPORTANT NOTICE REGARDING CONTENTS OF THIS REPORT

Please Read Carefully

The design, engineering, and other information contained in this document is furnished for the purposes of supporting the Exelon Generation Company, LLC (Exelon) license amendment request for an extended power uprate at Peach Bottom Atomic Power Station Units 2 and 3 in proceedings before the U.S. Nuclear Regulatory Commission (NRC). The only undertakings of GEH with respect to information in this document are contained in the contracts between GEH and its customers or participating utilities, and nothing contained in this document shall be construed as changing that contract. The use of this information by anyone for any purpose other than that for which it is intended is not authorized; and with respect to any unauthorized use, GEH makes no representation or warranty, and assumes no liability as to the completeness, accuracy, or usefulness of the information contained in this document.

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TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS:

Short Form	Description
ADS	Automatic Depressurization System
AOR	Analysis Of Record
APRM	Average Power Range Monitor
ARTS	(A)verage Power Range Monitor, (R)od Block Monitor and (T)echnical (S)pecification Improvement Program
ASD	Adjustable Speed Drive
ATWS	Anticipated Transient Without Scram
BWR	Boiling Water Reactor
CAP	Containment Accident Pressure
CD	Discharge Coefficient, as relates to Appendix K, Sec. I.C.1.b
CFR	Code of Federal Regulations
CLTP	Current Licensed Thermal Power
CLTR	Constant Pressure Power Uprate Licensing Topical Report
CPPU	Constant Pressure Power Uprate
CS	Core Spray
DBA	Design Basis Accident
DEG	Double Ended Guillotine (break)
ECCS	Emergency Core Cooling System
ELTR	Extended Power Uprate Licensing Topical Report
EPU	Extended Power Uprate
FFWTR	Final Feedwater Temperature Reduction
FWHOOS	Feedwater Heater Out of Service
GEH	GE Hitachi Nuclear Energy
HEM	Homogeneous Equilibrium Model
HPCI	High Pressure Coolant Injection
ICF	Increased Core Flow
IMLTR	Interim Methods Licensing Topical Report
LAR	Licensing Action Request
LBPCT	Licensing Basis Peak Cladding Temperature
LOCA	Loss Of Coolant Accident
LPCI	Low Pressure Coolant Injection
LPCIIV	LPCI Injection Valve
LPU	Licensed Power Uprate
LTR	Licensed Topical Report
MAPLHGR	Maximum Average Planar Linear Heat Generation Rate

ACRONYMS AND ABBREVIATIONS:

Short Form	Description
MELLLA	Maximum Extended Load Line Limit Analysis
MG	Motor Generator
NA	Not Applicable
NRC	Nuclear Regulatory Commission
OLTP	Original Licensed Thermal Power
PBAPS	Peach Bottom Atomic Power Station Units 2 & 3
RBM	Rod Block Monitor
RLTP	Re-Rate Licensed Thermal Power
RHR	Residual Heat Removal
PCT	Peak Clad Temperature
PLHGR	Peak Linear Heat Generation Rate
PUSAR	Power Uprate Safety Analysis Report
SLO	Single Loop Operation
TAF	Top of Active Fuel
TPU	Target Power Uprate
UFSAR	Updated Final Safety Analysis Report

1.0 SCOPE AND SUMMARY

1.1 Project Summary

Item	Parameter	Scope
1	Plant	Peach Bottom Atomic Power Station Units 2 and 3 (PBAPS)
2	Project	Extended Power Uprate (EPU)
3	Reactor Thermal Power Levels and Pressure	• Original Licensed Thermal Power (OLTP) of 3293 MWt • Current Licensed Thermal Power (CLTP) of 3514 MWt • Target Power Uprate (TPU) level of 3951 MWt • Licensed Power Uprate (LPU) level of 3951 MWt • 1.02xLPU level of 4030 MWt • No change in maximum nominal operating reactor dome pressure of 1050 psia.

1.2 Scope

Item	Parameter	Scope
1	Report Content	This report is generated at the request of the NRC staff to present supplemental information with regard to the ECCS-LOCA analyses performed, and conclusions drawn, which are reported in Reference 1. The information supports the License Amendment Request for EPU for the Peach Bottom Atomic Power Station which is pending before the NRC. Use of this background material is intended to allow completion of an independent review of the analysis and conclusion of its acceptability in support of the application.
2	Fuel Basis	This analysis is fuel dependent and associated with GEH fuel methodologies. GEH has performed these fuel-related tasks using GNF2 fuel designs, current and proposed plant configurations and current licensed methodologies to analyze the plant-specific response to the EPU conditions.
3	Task Evaluations (10 CFR 50.46 Acceptance Criteria)	• Compliance with 10 CFR 50.46 acceptance criteria is demonstrated. • Analysis is based on the current LOCA analysis assumptions, applying EPU power and flow state points, including updates reflecting system design, as necessary, to analyze the CPPU response.

Item	Parameter	Scope
3	Task Evaluations (continued)	[[ ]]

Item	Parameter	Scope
3	Task Evaluations (continued)	[[ ]] • The effect on the ECCS-LOCA response due to a reduced LPCI flow rate as a result of modifying the RHR system concurrent with EPU implementation is assessed. • An assessment is also included of the effect of Adjustable Speed Drive on the ECCS-LOCA analysis by re-analysis of bounding cases.

1.3 Results Summary

Item	Result	Summary
1	Key Evaluation Results	Key results within safety and design limits: • PCT, LBPCT, Maximum Local Oxidation, Core Wide Metal Water Reaction, Coolable Geometry and Long Term Cooling results are provided in Section 3.3.1. • 10 CFR 50.46 acceptance criteria are met with and without LPCI flow reduction. • Supporting evaluations and assessment of flexibility and equipment out of service options have been completed and shown to be acceptable.
		Key results outside design limits: • None
		Other evaluation results: • Section 1.3.1 [[ ]]

1.3.1 [[ ]]

[[

]]

2.0 REFERENCES

Item	Reference
1	"Safety Analysis Report for Exelon Peach Bottom Atomic Power Station Units 2 and 3 Constant Pressure Power Uprate," NEDC-33566P, Revision 0, September 2012
2	2.1 GE Nuclear Energy, "Generic Guidelines for General Electric Boiling Water Reactor Extended Power Uprate," NEDC-32424P-A, February 1999 (ELTR-1). 2.2 GE Nuclear Energy, "Generic Evaluations of General Electric Boiling Water Reactor Extended Power Uprate," NEDC-32523P-A, February 2000 (ELTR-2). 2.3 GE Nuclear Energy, "Generic Evaluations of General Electric Boiling Water Reactor Extended Power Uprate," NEDC-32523P-A, Supplement 1, Volume I, February 1999 (ELTR-2). 2.4 GE Nuclear Energy ,"Generic Evaluations of General Electric Boiling Water Reactor Extended Power Uprate," NEDC-32523P-A, Supplement 1, Volume II, April 1999 (ELTR-2). 2.5 GE Nuclear Energy, "Constant Pressure Power Uprate," NEDC-33004P-A, Class III (Proprietary), Revision 4, July 2003.
3	"GE Nuclear Energy, "Applicability of GE Methods to Expanded Operating Domains," NEDC-33173P-A, Revision 1, September 2010.
4	GE Nuclear Energy, "General Electric Company Analytical Model for Loss-of-Coolant Analysis in Accordance with 10 CFR 50 Appendix K," NEDO-20566A, September 1986.
5	GE Nuclear Energy, "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident, Volume I, GESTR-LOCA - A Model for the Prediction of Fuel Rod Thermal Performance," NEDE-23785-1-PA, Revision 1, October 1984.
6	"SAFER Model for Evaluation of Loss-of-Coolant Accidents for Jet Pump and Non-Jet Pump Plants," NEDE-30996P-A, General Electric Company, October 1987.
7	GE Nuclear Energy, "Compilation of Improvements to GENE's SAFER ECCS-LOCA Evaluation Model," NEDC-32950P, Revision 1, July 2007.
8	Letter, S.A. Richards (NRC) to J.F. Klapproth (GE), "Review of NEDC-32084P, 'TASC-03A, A Computer Program for Transient Analysis of a Single Fuel Channel' (TAC No. MB0564)," March 13, 2002.
9	"TASC-03A, A Computer Program for Transient Analysis of a Single Fuel Channel," NEDC-32084P-A, Revision 2, General Electric Company, July 2002.
10	GE Nuclear Energy, "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident, Volume III, SAFER/GESTR Application Methodology," NEDC-23785-1-PA, Revision 1, October 1984.
11	Letter, C.O. Thomas (NRC) to J.F. Quirk (GE), "Acceptance for Referencing of Licensing Topical Report NEDE-23785P, Revision 1, Volume III (P), "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident," June 1, 1984.
12	GE Nuclear Energy, "General Electric Standard Application for Reactor Fuel," NEDE-24011-P-A-16-US (GESTAR II), October 2007.
13	"Steady State Nuclear Methods," NEDE-30130-P-A, April 1, 1985.

Item	Reference
14	Letter MFN-212-78, D. G. Eisenhut (NRC) to R. L. Gridley (GE), "Safety Evaluation for the GE LTR, Generic Reload Fuel Application, Original Document NEDE-24011," May 12, 1978.

3.0 EVALUATION

3.1 Methodology

Item	Method	Task Application
1	NRC approved or accepted method (including approved computer codes)	• Extended Power Uprate LTR (Reference 2). • GEH Methods for Extended Operating Domains (Reference 3). • LAMB-08 (Reference 4) [[ ]] • GESTR08 (Reference 5) [[ ]] • SAFER04 [1,2,3] (References 6 and 7) [[ ]] • TASC-03 [4] (References 8, 9) [[ ]] • SAFER/GESTR-LOCA application methodology (Reference 10). • References 11 and 12 document the NRC acceptance of SAFER/GESTR.
2	Acceptable use of computer codes not approved by NRC	• [[•]] • ISCOR09 [5] (Heat Balance) [[ ]]Footnote citation (References 13 and 14) documents the NRC acceptance of the ISCOR model. The ISCOR code is not approved by name. However, the SER supporting approval of the application finds the models and methods acceptable and mentions the use of a digital computer code, which is ISCOR.
3	Non reviewed numerical analysis	• None
4	Qualitative method	• None

(1) Letter, J. F. Klapproth (GE) to USNRC, Transmittal of GE Proprietary Report NEDC-32950P, "Compilation of Improvements to GENE's SAFER ECCS-LOCA Evaluation Model," dated January 2000 by letter dated January 27, 2000.
(2) Letter, S. A. Richards (NRC) to J. F. Klapproth (GE), "General Electric Nuclear Energy (GENE) Topical Reports GENE (NEDC)-32950P and GENE (NEDC)-32084P Acceptability Review," May 24, 2000.
(3) "SAFER Model for Evaluation of Loss-of-Coolant Accidents for Jet Pump and Non-Jet Pump Plants," NEDE-30996P-A, General Electric Company, October 1987.
(4) The NRC approved the TASC-03A code by letter from S. A. Richards (NRC) to J. F. Klapproth (GE Nuclear Energy), Subject: "Review of NEDC-32084P, TASC-03A, A Computer Code for Transient Analysis of a Single Fuel Channel," TAC NO. MB0564, March 13, 2002. The acceptance version has not yet been published.
(5) The ISCOR code is not approved by name. However, the SER supporting approval of NEDE-24011P Rev. 0 by the May 12, 1978 letter from D. G. Eisenhut (NRC) to R. Gridley (GE) finds the models and methods acceptable, and mentions the use of a digital computer code. The referenced digital computer code is ISCOR. The use of ISCOR to provide core thermal-hydraulic information in reactor internal pressure differences, Transient, ATWS, Stability, Reactor Core and Fuel Performance and LOCA applications is consistent with the approved models and methods.

3.1.1 *10 CFR 50.46 ECCS Acceptance Criteria Definition*

Item	Analysis Category	Description
1	Peak Cladding Temperature	The calculated maximum fuel element cladding temperature shall not exceed 2200°F.
2	Maximum Cladding Oxidation	The calculated total local oxidation shall not exceed 0.17 times the total cladding thickness before oxidation.
3	Maximum Hydrogen Generation	The calculated total amount of hydrogen generated from the chemical reaction of the cladding with water or steam shall not exceed 0.01 times the hypothetical amount that would be generated if all the metal in the cladding cylinder surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react.
4	Coolable Geometry	Calculated changes in core geometry shall be such that the core remains amenable to cooling.
5	Long Term Cooling	After any calculated successful initial operation of the ECCS, the calculated core temperature shall be maintained at an acceptably low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core.

3.2 Input and Assumptions

3.2.1 *Key Inputs*

Item	Parameter	Units	Nominal	Appendix K
1	Re-Rate Licensed Thermal Power (RLTP)	MWt	3458	3528
2	Corresponding Power (% of OLTP)	%	105	107
3	Current Licensed Thermal Power (CLTP) (Re-Rate with TPO)	MWt	3514	3528
4	Corresponding Power (% of OLTP)	%	106.6	107
5	Analysis Of Record (AOR): ECCS-LOCA Analysis Power	MWt	3623	3695
6	Corresponding Power (% of OLTP)	%	110	112
7	Extended Power Uprate (EPU)	MWt	3951	4030
8	Vessel Steam Dome Pressure	psia	1060	1063
9	Rated Core Flow	Mlbm/hr	102.5	102.5
10	MELLLA Case Core Flow	Mlbm/hr	88.939	88.939
11	Recirculation Suction Line Break Area (1)	ft^2	4.168	4.168
12	Recirculation Discharge Line Break Area (2)	ft^2	1.958	1.958
13	GNF2 Number of Fuel Rods per Bundle	NA	92	92
14	GNF2 PLHGR	kW/ft	13.75	14.40
15	GNF2 MAPLHGR	kW/ft	13.15	13.78
16	GNF2 Worst Pellet Exposure for ECCS Evaluation	MWd/MT	14600	14600
17	Single Failure Input	NA	Battery	Battery
18	Limiting Recirculation Large Break Location	NA	Suction	Suction
19	Limiting Recirculation Small Break Location	NA	Discharge	Discharge
20	Number of ADS Valves Assumed Available(5)	--	5	5
21	LPCI Base Rated Flow(4)	gpm	8700	8700
22	LPCI Reduced Flow (3,4)	gpm	6500	6500
23	Time Constant of Recirculation Pump Coastdown (MG Set)	Sec	5	5

Item	Parameter	Units	Nominal	Appendix K
24	Time Constant of Recirculation Pump Coastdown (Adjustable Speed Drive)	Sec	3	3

(1) The maximum recirculation suction line break area is the recirculation suction line break area (4.168 ft^2) including the bottom head drain area (0.021 ft^2).

(2) The maximum recirculation discharge line break area is the recirculation discharge line break area (1.958 ft^2) including the bottom head drain area (0.021 ft^2).

(3) See Section 3.2.2 (below) for explanation.

(4) Value indicated is minimum LPCI flow delivered to the vessel for a single LPCI pump. Analysis input is further reduced to account for generic leakage assumption per methodology.

(5) Design communication from the licensee confirms there is no single failure which would eliminate all ADS functionality. Further, no out of service options on ADS valves or components are credited in the analysis.

3.2.2 *Key Inputs for LPCI Flow Reduction*

Item	Parameter	Description
1	LPCI flow rates	GEH has performed a re-evaluation of the large and small break LOCA fuel response using the revised LPCI flow rates supplied by Exelon. The reduction in LPCI flow is being imposed in support of a design objective to remove the need for Containment Accident Pressure (CAP) credit. The subsequent ECCS-LOCA SAFER/GESTR results are presented in Section 3.3.1 as an incremental change to the nominal, Appendix K and Licensing Basis PCT results, indicating this effect can be accounted for and still show compliance to 10 CFR 50.46 Acceptance Criteria. The effect of power uprate is clearly shown in the licensing submittal.

3.2.3 *Key Assumptions*

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3.3 Results

3.3.1 *Key Results for LPU Value*

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10 CFR 50.46 Acceptance Criteria Results

Item	Parameter	Unit	CLTP	EPU [1]	10 CFR 50.46 Limit
1	Licensing Basis PCT [2]	°F	< 1870	< 1925	≤ 2200
2	Maximum Local Oxidation	%	< 4	< 4	≤ 17
3	Core Wide Metal Water Reaction	%	< 0.1	< 0.1	≤ 1.0
4	Coolable Geometry	NA	Acceptable	Acceptable	PCT < 2200 °F and Local Oxidation <17%
5	Long Term Cooling	NA	Acceptable	Acceptable	Core flooded to TAF OR Core flooded to jet pump suction elevation and at least one CS system is operating at rated flow.

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4.0 [[ ]]

Attachment 7

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

GEH Affidavit for Withholding Information Executed by GEH for Attachment 5

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, Linda C. Dolan, state as follows:

(1) I am the Manager, Regulatory Compliance of GE-Hitachi Nuclear Energy Americas LLC (GEH), and have been delegated the function of reviewing the information described in paragraph (2) that is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in GEH proprietary report NEDC-33791P, "Peach Bottom Atomic Power Station Units 2 & 3 Extended Power Uprate ECCS-LOCA Analysis Summary Information," Revision 0, dated December 2012. GEH proprietary information in NEDC-33791P is identified by a dark red dotted underline inside double square brackets, [[This sentence is an example.{3}]]. Figure and large equation objects 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, which provides the basis for the proprietary determination.

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

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

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

(8) The information identified in paragraph (2), above, is classified as proprietary because it contains detailed results of an analysis performed by GEH to support the Peach Bottom Unit 1 and 2 Extended Power Uprate (EPU) license application. This analysis is part of the GEH EPU methodology. Development of the EPU methodology and supporting analysis, techniques, and information and their application for the design, modification, and processes were achieved at a significant cost GEH.

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

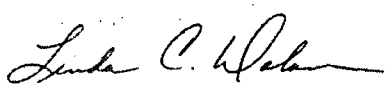
(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value 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 17th day of December 2012.



Linda C. Dolan
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Attachment 8

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Corrections to PBAPS LAR Submitted September 28, 2012

1.0 Summary Description

Corrections and clarifications were identified following the September 28, 2012, Peach Bottom Atomic Power Station (PBAPS) Extended Power Uprate (EPU) License Application Request (LAR) (Reference 3.1). The errors were entered into the Exelon Generation Corporation, LLC, (EGC) corrective action program. Corrections and clarifications are being submitted to prevent unnecessary Requests for Additional Information (RAI). A description of the corrections and a conclusion of the impact of each correction are provided in this Attachment. Additions are indicated with bolded characters and deletions are indicated with strikethrough markers. Detailed discussions for each of the corrections and the revised paragraph or table are provided in Section 2.0. These corrections pertain to reference and description information related to the elimination of Containment Accident Pressure (CAP) Credit provided in the PBAPS EPU LAR. This information is contained in Attachments 1 and 9 and Enclosures 9c, 9d and 9e of the original submittal. EGC performed a review that concluded these changes do not affect the analyses performed, the conclusions reached, or the justification utilized for the elimination of CAP Credit for the proposed EPU.

The corrections consist of the following:

1.1 Deletion of reference to the Safety Relief Valve Transient (SRVT) event.

1.2 Deletion of Reference of Option to use Suppression Pool (SP).

1.3 Clarification of Net Positive Suction Head $(NPSH)_{3\%}$ definition.

1.4 Clarification of use of the Residual Heat Removal (RHR) cross-tie valve for the SRVT events.

1.5 Clarification of Existing Plant Configuration Information.

1.6 Correction of Single Failure Assumptions.

1.7 Clarification of statements regarding the basis for the maximum SP water level.

1.8 Correction to Suppression Pool High Level Setpoint Bases description.

1.9 Correction of Current Licensing Basis (CLB) values for the initial SP temperature in tables listing parameters related to CAP Credit.

1.10 Clarification of the CLB parameters for the Loss of RHR Normal Shutdown Cooling (NSDC) event.

1.11 Clarification of initial Drywell (DW) temperature for SRVT events.

1.12 Clarification of the HPCI system pump suction source and Initial SP Level for the Anticipated Transient Without SCRAM (ATWS) event.

1.13 Correction of CLB values for the 10CFR50, Appendix R, Fire Safe Shutdown Events in a table listing parameters related to CAP Credit.

2.0 Detailed Description

2.1 Deletion of Reference to SRVT Event

PBAPS EPU LAR Attachments 1 and 9 (Reference 3.1) contain discussions of elimination of CAP Credit for post EPU conditions and reliance on the CST. These discussions include the use of CST inventory addition to the SP for the NPSH analyses during the limiting SRVT event, Station Blackout (SBO), ATWS and Appendix R Fire Safe Shutdown Methods A, B, and D. These discussions incorrectly include the SRVT event.

The specific sections affected are:

1. Attachment 1 Section 2.6.3,
2. Attachment 1 Section 3.2, last bullet,
3. Attachment 9 Section 3.2.3.1, last bullet, and
4. Attachment 9 Table 9-4 SRVT event, last bullet.

These corrections delete crediting the use of the CST inventory addition in the NSPH analysis for the SRVT event from the LAR locations listed below. The EPU analyses performed related to these discussions are correct and are unaffected by these corrections to the EPU LAR Attachments.

The corrected sections are provided below:

1. Attachment 1, Section 2.6.3
   "3. The use of CST inventory without transfer to the suppression pool is credited during the ~~limiting Safety Relief Valve Transient (SRVT) event,~~ Station Blackout (SBO), Anticipated Transient Without Scram (ATWS) and Appendix R Fire Safe Shutdown Methods A, B, and D. This change is discussed in more detail in Attachment 9, Section 3.2 and in Enclosure 9e."

2. Attachment 1, Section 3.2, last bullet
   "• The use of CST inventory without transfer to the suppression pool is credited during the ~~limiting SRVT event,~~ SBO, ATWS and Appendix R Fire Safe Shutdown Methods A, B, and D. This will improve NPSH margin and support the elimination of CAP Credit during these events. The use of CST is discussed in Attachment 9 and also in Enclosure 9e."

3. Attachment 9, Section 3.2.3.1, last bullet
   "• Inventory addition to the suppression pool from the CST with the use of the RCIC or HPCI pumps for Reactor Pressure Vessel makeup without transfer to the suppression pool is credited during ~~SRVT~~ SBO, ATWS and Appendix R Fire Safe Shutdown Cases A, B and D. This will improve NPSH margin and support the elimination of CAP Credit during these events."

4. Attachment 9, Table 9-4, SRVT event, last bullet

   The revised Attachment 9 Table 9-4 is provided after Section 3 below.

2.2 Deletion of Reference of Option to use SP

PBAPS EPU LAR Attachment 9 and Attachment 9 Enclosure 9e (Reference 3.1) contain statements related to the reliance on the use of the CST as the primary suction source for HPCI and RCIC system pumps. The specific sections affected are:

1. Attachment 9 Section 3.2.3.2, paragraph 6,
2. Attachment 9 Enclosure 9e Section 1.0, paragraph 2, and
3. Attachment 9 Enclosure 9e Section 3.3, paragraph 1.

These discussions include statements that the SP may be used as a suction source for the HPCI and RCIC systems, if necessary. Use of the SP is not credited in the specific transient analyses being discussed. These corrections delete the option to use the SP as a suction source for the HPCI and RCIC system pumps where the transient analyses only rely on the CST as the pump suction source. These corrections delete text that the SP can be used if necessary from the below listed paragraphs. The EPU analyses

performed related to these discussions are correct and are unaffected by these corrections to the EPU LAR Attachments.

The corrected sections are provided below:

1. Attachment 9, Section 3.2.3.2, paragraph 6

   "The calculated maximum usage of the HPCI and RCIC pumps during SBO is well within the CST inventory. ~~Although the CST is the primary suction source during an SBO, the suppression pool can be used if necessary.~~ The PBAPS SBO event licensing basis requires an 8-hour coping capability with alternate AC power available within one hour. At 30 minutes into the event, operators secure HPCI and continue RCIC operation to maintain reactor water level."

2. Attachment 9 Enclosure 9e, Section 1.0, paragraph 2

   "This enclosure discusses modifications and operational (procedure) changes being made to the Condensate Storage and Transfer System and primary containment suppression pool system instrumentation for suppression pool level. The described modifications and operational changes ensure that the only suction source for High pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) during the entire Anticipated Transient Without SCRAM (ATWS), **Station Blackout (SBO)** and Appendix R events is the Condensate Storage Tank (CST). ~~For Station Blackout (SBO), the CST will be the primary suction source for HPCI and RCIC, however, the suppression pool can be used if necessary~~. The CST has adequate inventory for mitigating an SBO. However, the Refueling Water Storage Tank (RWST) will be relied upon to provide the additional adequate condensate supply to the CST for the duration of the Anticipated Transient Without Scram (ATWS) and Appendix R event scenarios."

3. Attachment 9 Enclosure 9e, Section 3.3, paragraph 1

   "The ATWS, **SBO** and Appendix R events for EPU rely upon HPCI and RCIC pump suctions aligned only to the CST for the entire event. ~~For SBO, the CST is the primary suction source, but the suppression pool can be used is necessary~~. In the case of ATWS and Appendix R, the CST volume will be supplemented by the RWST volume, which will be transferred by gravity draining the RWST as described in Section 3.2. Appendix R Shutdown Method ~~A1~~**B1** provides the **limiting case for the Suppression Pool high level setpoint for the HPCI system pump suction swapover**. ~~bounding (largest) water volume to consider maximum volume, while Shutdown Method B1 provides the bounding water volume while operating with HPCI. Shutdown Method B1 is the bases of the suppression pool water high setpoint.~~ The CST supplemented volume will permit operation of the HPCI pump during the entire event, the supplemented volume will cause the plant high suppression pool water level swap over setpoint and the current allowable value of TS Table 3.3.5.1-1, Function 3.e, "Suppression Pool Water Level – High," to be exceeded."

2.3 Clarification of $NPSH_{3\%}$ Definition

PBAPS EPU LAR Attachment 9 (Reference 3.1) section 3.2.3, paragraph 2 contains a statement that incorrectly defines the $NPSH_{3\%}$ term for the Emergency Core Cooling System (ECCS). The correct definition does not rely on a recommended minimum pump head term and this phrase is deleted. The EPU analyses performed related to these discussions are correct and are unaffected by these corrections to the EPU LAR Attachment.

The corrected text for Attachment 9 Section 3.2.3, paragraph 2, is provided below:

> "The NPSH analyses described in PUSAR 2.6.5.2 assume a pressure of 0 psig in the suppression pool. $NPSHR_{3\%}$ is the ECCS pump vendors **NPSH required value** ~~recommended minimum~~ based on a 3% reduction in pump head during testing. $NPSHr_{eff}$ includes any uncertainty applied in accordance with NRC draft guidance in SECY 11-0014. For PBAPS, 21% uncertainty is applied to the DBA-LOCA and the SSLB and 0% uncertainty for other events."

2.4 Clarification of Use of RHR Cross-Tie Valve for the SRVT Events

PBAPS EPU LAR Attachment 9 Enclosure 9c (Reference 3.1) section 3.3 contains an incomplete statement that ties the use of the RHR Heat Exchanger cross-tie valve with CAP Credit elimination for the SRVT event. This information does not provide a clear explanation of the specific SRVT events that rely on CAP Credit and the EPU analyses that eliminate CAP Credit. A replacement section is provided to clarify the statement. The EPU analyses performed related to these discussions are correct and unaffected by these corrections to the EPU LAR Attachments.

The corrected text for Attachment 9 Enclosure 9c Section 3.3 is provided below:

> **"The CLB also takes credit for CAP for the NUREG-0783 evaluation of the Safety Relief Valve Transient (SRVT) events, specifically the limiting event of the Stuck Open Relief Valve (SORV). EPU analysis eliminates CAP for this SORV event, as well as the SRVT event of a Small Break Accident with a LOOP. Both of these SRVT events take credit for the improved heat exchanger performance and credit operation of the new flow control valves to control flow to provide adequate cooling with the design flow rate of 8,600 gpm. The Small Break Accident with a LOOP event also relies on opening of the RHR cross-tie valve at EPU conditions. These changes will ensure that the NPSH required is below the NPSH available with margin without CAP credit. The SRVT terminology as defined herein is used to describe the bounding NUREG-0783 event and analysis (SORV).**
> ~~CAP is credited in the current NPSH analyses for a safety relief valve transient (SRVT) consisting of a stuck open relief valve with reactor pressure vessel isolation[1]. With implementation of the RHR cross-tie modification, CAP credit is eliminated for the SRVT event at EPU conditions with a LOOP and a single failure of a 125VDC battery by opening the cross-tie valve and initiating flow through two RHR heat exchangers with one RHR pump.~~
>
> ~~[1] The Minimum Containment pressure Analysis in the current licensing basis analyzed for an Inadvertent Open Relief Valve (IORV) event. The SRVT as defined herein bounds the Stuck Open Relieve Valve (SORV) and the SRVT term will be used in this LAR.~~"

2.5 Clarification of Existing Plant Configuration Information

PBAPS EPU LAR Attachment 9 and Attachment 9 Enclosure 9c (Reference 3.1) contain incorrect information on the HPCI and RHR system pumps and valves and electrical equipment failures for the existing plant configuration. The errors are in Attachment 9 section 3.2.1, Attachment 9 Enclosure 9c section 2.1 paragraphs 3, 4 and 9 and Attachment 9 Enclosure 9c section 4.1.2. The EPU analyses performed related to these discussions are correct and unaffected by these corrections to the EPU LAR Attachments.

The corrected sections are provided below:

1. Attachment 9 Section 3.2.1 paragraph 6

   "The HPCI pumps are not included in the table although they **can** take suction from the suppression pool for all events in the CLB. They are limited to a suppression pool temperature of 180°F due to equipment constraints, and are normally turned off by procedure before exceeding the limit if not required for adequate core cooling. EPU does not affect the HPCI pump NPSH available and the NPSH margin for the HPCI pump at 180°F is 1.0 feet."

2. Attachment 9 Enclosure 9c Section 2.1 paragraph 3

   "The major components in the RHR system are four main system RHR pumps and four RHR heat exchangers. Four HPSW pumps for each unit support the heat removal function of the RHR system. The RHR pumps are sized on the basis of the flow required by the LPCI mode of RHR operation. The heat exchangers are sized on the basis of their required duty for the ~~shutdown~~ **containment** cooling function. Large capacity passive pump suction strainers have been installed on each RHR suction line in the suppression pool in response to NRC I.E. Bulletin 96-03 "Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in Boiling Water Reactors." The functional components of the RHR system are designed in accordance with seismic Class I criteria."

3. Attachment 9 Enclosure 9c Section 2.1 paragraph 4

   "The RHR pumps are powered from the 4-kV emergency auxiliary buses. Each of the four RHR pump motors ~~together with its associated automatic motor operated valve~~ receives AC power from a separate 4-kV bus. Similarly, control power for each pump motor comes from separate DC buses."

4. Attachment 9 Enclosure 9c Section 2.1 paragraph 9

   "In the current licensing basis **with CAP credit**, the heat removal capability of one RHR pump and one heat exchanger in one subsystem is sufficient to meet the overall DBA **suppression** pool cooling requirement for loss of coolant accidents (LOCAs) with a loss of offsite power **and the worst case single failure** ~~and failure of a 125 VDC safety related battery. The failure of a 125 VDC safety related battery causes the loss of the associated Emergency Diesel Generator (EDG) and 4 KV emergency auxiliary bus~~. The cooling capability of this stated RHR system equipment is also sufficient for transient events such as a turbine trip or stuck open safety/relief valve. As a result, any one of the four RHR suppression pool cooling subsystems can provide the required suppression pool cooling function."

5. Attachment 9 Enclosure 9c Section 4.1.2 paragraph 4

   "The RHR pumps are each powered from separate 4 KV emergency auxiliary buses and EDGs. The cross-tie MOVs will be powered from ~~redundant~~ safety-related power sources through separate 4KV buses from an EDG such that the failure of one EDG will not result in the loss of function of the cross-tie in both loops. The new control MOVs will be powered from the **same** EDG ~~associated with~~ **as** the **associated** RHR pump ~~and automatic valves in that loop~~. The new RHR cross-tie MOVs are not considered in the EDG loading calculations since the stroke time is limited and they are an intermittent load that occurs after all the immediate actions in the first 10 minutes have been completed. Refer to section 5.0, Operating with the cross-tie for operation of the RHR heat exchanger cross-tie MOVs."

2.6 Correction of Single Failure Assumptions

PBAPS EPU LAR Attachment 9 Enclosures 9c and 9d (Reference 3.1) contain discussions on accident analyses and related single failure assumptions for CLB and EPU conditions. These discussions incorrectly cite the failure of a 125 VDC safety related battery as the assumed single failure contained in the analyses. The specific sections affected include Attachment 9 Enclosure 9c Sections 2.1 paragraph 9, 3.1, paragraphs 1, 3 and 5, 6.1 title, 6.2 title, 6.2.a.3 paragraph 2, 6.2.b. 6.2.c.4, 6.2.d.4, 6.2.e.4 and 6.2.f. Additionally, the specific sections include Attachment 9 Enclosure 9d Sections 2.2.3, 4.1.1 paragraph 1, 6.1 title and 6.2 title. The EPU analyses performed related to these discussions are correct and unaffected by these corrections to the EPU LAR Attachments.

The corrected sections are provided below:

1. Attachment 9 Enclosure 9c Section 2.1 paragraph 9

   "In the current licensing basis **with CAP credit**, the heat removal capability of one RHR pump and one heat exchanger in one subsystem is sufficient to meet the overall DBA pool cooling requirement for loss of coolant accidents (LOCAs) with a loss of offsite power **and the worst case single failure** ~~and failure of a 125 VDC safety related battery. The failure of a 125 VDC safety related battery causes the loss of the associated Emergency Diesel Generator (EDG) and 4 KV emergency auxiliary bus~~. The cooling capability of this stated RHR system equipment is also sufficient for transient events such as a turbine trip or stuck open safety/relief valve. As a result, any one of the four RHR suppression pool cooling subsystems can provide the required suppression pool cooling function."

2. Attachment 9 Enclosure 9c Section 3.1 paragraph 1

   "In the current licensing basis, with the current RHR system configuration, CAP credit is required for the RHR and Core Spray pumps during the DBA LOCA and the small steam line breaks (SSLB). The bounding event for CAP, however, is the DBA LOCA with loss of offsite power (LOOP) **and the worst case single failure** ~~and failure of a 125VDC safety related batter (and resulting loss of associated EDG)~~."

3. Attachment 9 Enclosure 9c Section 3.1 paragraph 3

   "The containment response analyses at EPU conditions **with Loss of Offsite Power and the loss of one emergency AC electrical power source** for the DBA LOCA and for the limiting SSLB **accident** ~~with Loss of Offsite Power and a single failure of a 125 VDC safety related battery~~ assume no operator action for the first ten minutes. During this initial period of the DBA LOCA, the RHR pumps are operating in their

LPCI mode with two pumps operating in one loop and one pump in the other. With implementation of the RHR heat exchanger cross-tie modification, the RHR runout flow in the LPCI mode is reduced to 10,600 gpm. At ten minutes after the event, the operator stops two of the LPCI/RHR pumps, switches the third LPCI/RHR pump into containment cooling mode using the one available heat exchanger, and establishes RHR flow at 8600 gpm with the new flow control valves. The analysis also assumes that the RHR heat exchanger K-value is increased from a CLTP value of 270 BTU/sec-°F to a minimum value of 305 BTU/sec-°F for EPU. Other than the flow rate, there is no change as a result of EPU to the automatic and manual actions at this point in the current analysis."

4. Attachment 9 Enclosure 9c Section 3.1 paragraph 5

   "The NPSH analysis at EPU conditions for the Loss of RHR Normal Shutdown Cooling with a LOOP **and the loss of one emergency AC electrical power source** ~~and a single failure of a 125 VDC safety related battery~~ also assumes the opening of the RHR cross-tie valve with one RHR pump cross-tied to two heat exchangers and no CAP credit."

5. Attachment 9 Enclosure 9c Section 6.1 Title

   "6.1 With **Failure of One Emergency AC Electrical Power Source** ~~Single Failure of a 125 VDC Safety related Battery~~:"

6. Attachment 9 Enclosure 9c Section 6.2 Title

   "6.2 Without a **Failure of One Emergency AC Electrical Power Source** ~~single Failure of a 125 VDC Safety Related Battery~~:"

7. Attachment 9 Enclosure 9c Section 6.2.a.3 paragraph 2

   "If it is also assumed that there is no HPSW cooling water supplied to the non-operating RHR heat exchanger, then the valve opening would result in a partial loss of RHR heat exchanger cooling. This could be a concern in the SDC mode when one RHR pump is in operation. This failure is bounded by a single failure which fails the entire division in the current design basis. The loss of one RHR division (I or II) is acceptable since the remaining RHR division would be available. This failure would not need to be considered in the elimination of CAP credit evaluation since it assumes the worst case single failure is loss of **one emergency AC electrical power source** ~~a 125 VDC safety related battery~~."

8. Attachment 9 Enclosure 9c Section 6.2.b

   "If the RHR cross-tie MOV fails closed while one or both RHR pumps are operating, there would be a loss of capability to use the RHR heat exchanger cross-tie. The cross-tie is not required to be open for events other than the design basis cases that also assume **loss of one emergency AC electrical power source** ~~single failure of a 125 VDC safety related battery~~. This failure would not need to be considered for the design basis cases."

9. Attachment 9 Enclosure 9c Section 6.2.c.4

   "If the RHR heat exchanger flow control valve fails closed while the RHR heat exchanger cross-tie MOV is open and one RHR pump is operating, a partial loss of RHR flow capability through the cross-tied heat exchanger **would occur**, returning the division to a one RHR pump/one HPSW pump/one RHR heat exchanger configuration. Minimum design flow of 4000 gpm through the control valve would

remain. This failure is bounded by the single failure of one RHR pump or a single failure of a valve (failing closed) in the common RHR heat exchanger discharge line which fails the entire division. The loss of one RHR division (I or II) is acceptable since the remaining RHR division would be available. Note that the cross-tie is not required to be open for events other than the design basis cases that also assume **loss of one emergency AC electrical power source** ~~single failure of a 1256 VDC safety related battery~~."

10. Attachment 9 Enclosure 9c Section 6.2 d.4

"If the RHR heat exchanger flow control valve fails full open while the RHR heat exchanger cross-tie MOV is open and one RHR pump is operating, the result is similar to failure with both pumps operating. For RHR modes of operation that take suction from the torus, the operator would be required to take action to prevent pump runout and/or place the redundant RHR division into operation. Note that the RHR heat exchanger cross-tie is not required to be open for events other than the design basis cases that also assume **loss of one emergency AC electrical power source** ~~single failure of a 125 VDC safety related battery~~."

11. Attachment 9 Enclosure 9c Section 6.2.e.4

"If the flow indicator fails while the RHR heat exchanger cross-tie MOV is open and one RHR pump is operating, a reduction in capability for remote manual balance of RHR flow between the cross-tied RHR heat exchangers results. Existing flow indicators could be used to determine approximate flow through the heat exchanger with the failed indicator. Note that the RHR cross-tie is not required to be open for events other than the design basis cases that also assume **loss of one emergency AC electrical power source** ~~single failure of a 125 VDC safety related battery~~."

12. Attachment 9 Enclosure 9c Section 6.2.f

"The RHR heat exchanger cross-tie will perform its function with loss of one EDG or 4 kV bus. The cross-tie and associated control valves and instrumentation are installed in both RHR Divisions I and II. The components are powered from redundant power supplies. To recover from the failure, the Operator would need to perform load shedding on one of the remaining three operable EDGs and load the additional HPSW pump. This failure would not need to be considered for the design basis cases, which assume **loss of one emergency AC electrical power source** ~~single failure of a 125 VDC safety related battery that includes a loss of one EDG~~."

13. Attachment 9 Enclosure 9d Section 2.2.3

"The HPSW Cross-tie Modification in conjunction with the RHR Cross-tie Modification will enable the elimination of CAP credit. It will not, however, change the HPSW system safety design function as set forth in UFSAR 10.7. The analysis for the DBA LOCA with loss of offsite power and the **loss of one emergency AC electrical power source** ~~single failure of a 125 VDC safety related battery~~ assumes that one RHR pump and one HPSW pump are placed in service for containment cooling at ten minutes following initiation of the event. ~~The failure of a 125 VDC safety related battery causes the loss of the associated Emergency Diesel Generator (EDG) and 4 KV emergency auxiliary bus.~~ One hour after the event, the Operator cross-ties a second RHR heat exchanger to the operating RHR pump and starts a second HPSW pump to provide cooling to the second RHR heat exchanger. The HPSW Cross-tie Modification enables the Control Room Operator to manually align the second HPSW pump from the opposite Division to provide cooling water to the

two operating RHR heat exchangers placed in service to provide the post-LOCA suppression pool cooling that will allow the elimination of CAP credit as discussed in Enclosure 9c. A single RHR pump is also assumed to be cross-tied to two RHR heat exchangers with two HPSW pumps providing cooling water during a small steam line break (SSLB), a safety relief valve transient (SRVT) with a loss of offsite power, and when operating RHR during a Loss of RHR Normal Shutdown Cooling event with loss of offsite power."

14. Attachment 9 Enclosure 9d Section 4.1.1 paragraph 1

"In order to eliminate credit for CAP and to maintain ECCS pump NPSH margin following the DBA LOCA coincident with a loss of offsite power and the **loss of one emergency AC electrical power source** ~~single failure of a 125 VDC safety related battery~~, a HPSW Cross-tie Modification will be installed in conjunction with the RHR Cross-Tie Modification (Enclosure 9c) for EPU. The HPSW Cross-tie Modification will enable the Control Room Operator to manually align two HPSW pumps to provide cooling water to the two cross-tied RHR heat exchangers that will be placed in service to provide for suppression pool cooling when only one RHR pump is available and the suppression pool temperature is elevated. The HPSW Cross-tie Modification is safety related. The new and replacement piping, valves and operators, and components installed in this modification are designed and classified as Seismic Class I."

15. Attachment 9 Enclosure 9d Section 6.1 title

"6.1 With **Failure of One Emergency AC Electrical Power Source** ~~a Single Failure of a 125 VDC Safety Related Battery~~"

16. Attachment 9 Enclosure 9d Section 6.2 title

"6.2 Without **Failure of One Emergency AC Electrical Power Source** ~~a Single Failure of a 125 VDC Safety Related Battery~~"

2.7 Clarification of Basis for Maximum SP Water Level

PBAPS EPU LAR Attachment 9 Enclosure 9e (Reference 3.1) contains discussions on the basis for maximum SP water level and the corresponding SP level set point for transfer of the HPCI system pump suction from the CST to the SP. The specific sections affected are:

1. Attachment 9 Enclosure 9e Section 2.1, page 3, paragraph 4,
2. Attachment 9 Enclosure 9e Section 2.1, page 3, paragraph 7, and
3. Attachment 9 Enclosure 9e Section 3.3, page 10, paragraph 2.

To provide clarity, the discussions of the basis are revised to include that the maximum SP water level is bounded by the SRV Tail Pipe level limits. The EPU analyses performed related to these discussions are correct and unaffected by these corrections to the EPU LAR Attachments.

The corrected sections are provided below:

1. Attachment 9 Enclosure 9e, Section 2.1, page 3, paragraph 4

"A high suppression pool water level condition causes an automatic transfer of the HPCI pump suction source from the CST to suppression pool. The basis for the CST transfer on high suppression pool level is to prevent the HPCI system from contributing to any further increase in the suppression pool level. The

maximum suppression pool water level is dictated by the **SRV Tail Pipe level limits**, the need to maintain air space to accommodate the non-condensable gases that are blown down to the suppression pool during an accident, and to limit steam discharge hydrodynamic loads in the suppression pool."

2. Attachment 9 Enclosure 9e, Section 2.1, page 3, paragraph 7

"The HPCI system supports Technical Specification (TS) operability of the PCPS system by transferring HPCI pump suction from the CST to the suppression pool prior to the suppression pool water level exceeding its high level setpoint during normal operation and following plant transients and design basis accidents (DBAs). This transfer of suction **is required to meet the SRV Tail Pipe level limits and** minimizes the steam discharge hydrodynamic loads on the pool boundary and submerged structures including the SRV discharge lines."

3. Attachment 9 Enclosure 9e, Section 3.3, page 10, paragraph 2

"The maximum water level limit is to ensure that the **SRV Tail Pipe level limits are not exceeded and that** the hydrodynamic loads which impinge on the submerged structures and pool boundary induced by steam discharges to the pool will not jeopardize primary containment integrity. Existing procedures indicate that the suppression pool should not exceed a maximum water level of 17.1 feet. The maximum credible water level is 16.5 feet for the Appendix R Shutdown Method B1 scenario. Therefore, there is no structural impact on the suppression pool and its support structures."

2.8 Correction to Suppression Pool High Level Setpoint Bases Description

PBAPS EPU LAR Attachment 1 Section 3.1.11 and Attachment 9 Enclosure 9e (Reference 3.1) section 3.3, paragraph 1, incorrectly describe the bases for the Suppression Pool high level setpoint for the HPCI system pump suction swap over. The text is revised to correctly reflect that the limiting case for the HPCI system pump suction swap over is the Appendix R Shutdown Method B1 analysis. The EPU analyses performed related to these discussions are correct and are unaffected by these corrections to the EPU LAR Attachments.

The corrected sections are provided below:

1. Attachment 1 Section 3.1.11

"Following EPU, the ATWS, Appendix R event, and Station Blackout analysis will rely solely on the CST rather than the suppression pool for the High Pressure Coolant Injection (HPCI) System suction source for the duration of the events. In the cases of ATWS and Appendix R, the Refueling Water Storage Tank (RWST) will also be relied upon for inventory. ~~The Appendix R Shutdown Method B1 scenario analysis results in the largest required condensate volume while operating with HPCI. Therefore,~~ Shutdown Method B1 volume is the volume basis for the change to Suppression Pool Water Level - High."

2. Attachment 9 Enclosure 9e Section 3.3, paragraph 1 is provided below:

"The ATWS**, SBO** and Appendix R events for EPU rely upon HPCI and RCIC pump suctions aligned only to the CST for the entire event. ~~For SBO, the CST is the primary suction source, but the suppression pool can be used is necessary~~. In the case of ATWS and Appendix R, the CST volume will be supplemented by the RWST volume, which will be transferred by gravity draining the RWST as

described in Section 3.2. Appendix R Shutdown Method ~~A1~~**B1** provides the **limiting case for the Suppression Pool high level setpoint for the HPCI system pump suction swap over**. ~~bounding (largest) water volume to consider maximum volume, while Shutdown Method B1 provides the bounding water volume while operating with HPCI. Shutdown Method B1 is the bases of the suppression pool water high setpoint.~~ The CST supplemented volume will permit operation of the HPCI pump during the entire event. The supplemented volume will cause the plant high suppression pool water level swap over setpoint and the current allowable value of TS Table 3.3.5.1-1, Function 3.e, "Suppression Pool Water Level – High," to be exceeded."

2.9 Correction of CLB values for Initial SP Temperature

PBAPS EPU LAR Attachment 9 (Reference 3.1) contains tables that compare CLB and EPU conditions for several parameters related to NPSH analyses. Tables 9-2a through 9-2e incorrectly list the Initial SP Temperature as 92 deg F. This correction revises these values to 95 deg F. Additionally, the sixth row header in Tables 9-2e and 9-2f were corrected to be consistent with the other tables. The new header reads, "Number of RHR Pumps/Heat Exchangers for LT Cooling." The EPU analyses performed related to these discussions are correct and unaffected by these corrections to the EPU LAR Attachments.

The corrected Attachment 9 Tables 9-2a through 9-2e are provided after Section 3 below.

2.10 Clarification of CLB Parameters for Loss of NSDC Event

PBAPS EPU LAR Attachment 9 (Reference 3.1) contains Table 9-2b that compares CLB and EPU conditions for parameters related to Containment analyses for the Loss of NSDC event with a Loss of Offsite Power (LOOP). The CLB analysis does not contain a specific calculation for the RHR pump NPSH for the RHR Loss of NSDC event. A note has been added to Table 9-2b to identify that the CLB parameters for the Loss of RHR NSDC event are based on the Containment analysis. Table 9-2b incorrectly lists the Core Spray (CS) system pump flow rate for long term cooling as "NA". The correct value of 3125 gpm is added to the table. There are no issues with the CLB plant documentation that existed prior to the EPU LAR submittal.

The corrected Attachment 9 Table 9-2b is provided after Section 3 below.

2.11 Clarification of Initial Drywell Temperature for SRVT Events

PBAPS EPU LAR Attachment 9 (Reference 3.1) contains Table 9-2c that compares CLB and EPU conditions for several parameters related to NPSH analyses for the SRVT events. For the spectrum of events analyzed for the SRVT events, parameter changes related to NPSH Calculations for EPU are provided in the table. Table 9-2c lists the CLB and EPU value for Initial Drywell Temperature as 145 and 70 deg F, respectively. The analysis for this event does not use this parameter since the Drywell is not modeled during the limiting SRVT event analysis. This correction removes these temperature values and adds a corresponding note. The EPU analyses performed related to these discussions are correct and unaffected by these corrections to the EPU LAR Attachments.

The corrected Attachment 9 Table 9-2c is provided after Section 3 below.

2.12 Clarification of the HPCI System Pump Suction Source and initial SP Level for ATWS Event

PBAPS EPU LAR Attachment 9 (Reference 3.1) contains Table 9-2e that compares CLB and EPU conditions for several parameters related to NPSH analysis for the ATWS event. This table lists the HPCI system pump suction source for CLB conditions. Table 9-2e for the ATWS event is corrected to reflect that the CST is the HPCI system pump suction source for the CLB analysis. Table 9-2e for the ATWS event is corrected to reflect the initial SP Level to be 125,100 ft^3 for EPU conditions with a change to the corresponding note. The EPU analyses performed related to these discussions are correct and unaffected by these corrections to the EPU LAR Attachments.

The corrected Attachment 9 Table 9-2e is provided after Section 3 below.

2.13 Correction of CLB Values for Appendix R Fire Safe Shutdown Events

PBAPS EPU LAR Attachment 9 (Reference 3.1) contains Table 9-2f that compares CLB and EPU conditions for several parameters related to NPSH analyses. Table 9-2f incorrectly lists the CLB values for four (4) parameters: Initial SP Temperature, Ultimate Heat Sink (UHS) Temperature, RHR Heat Exchanger Heat Transfer Capacity and HPCI pump suction. Table 9-2f incorrectly reflects that the HCPI system pump operation is limited in the analysis to a particular suction source. The note for the Initial SP Temperature is also corrected to delete reference to the TS limit. There are no issues with the CLB plant documentation that existed prior to the EPU LAR submittal.

The corrected Attachment 9 Table 9-2f is provided after Section 3 below.

3.0 References:

3.1. 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)

3.2 Letter from R. B. Ennis (U. S. Nuclear Regulatory Commission) to M. J. Pacilio, (Exelon Generation Company, LLC), "Peach Bottom Atomic Power Station, Units 2 and 3, Supplemental Information Needed for Acceptance of Requested Licensing Action Re: Extended Power Uprate (TAC Nos. ME9631 and ME9632)," dated December 18, 2012

Table 9-2a
Key Changes in Inputs to NPSH Calculations for EPU

Long Term DBA LOCA and SSLB

	CLB	EPU	Notes
SP Initial Temperature (°F)	~~9295~~	95	TS 3.6.2.1 limit
SP Initial Volume, ft^3	122,900	122,900	TS 3.6.2.2 low limit
DW Initial Temperature (°F)	145	70	145°F is the TS 3.6.1.4 limit. Initial conditions for EPU (70 °F) are assumed that maximize suppression pool temperature while also maximizing containment pressure response.
UHS Temperature (°F)	92	92	TS 3.7.2 limit.
Credit for Passive Heat Sinks	No	Yes	EPU for long term with no heat loss through containment walls.
Number of RHR Pumps/Heat Exchangers for LT Cooling	1/1	1/2	At EPU, the operating RHR pump is cross tied to 2 RHR heat exchangers
RHR Pump Flow Rate Long Term Cooling (gpm)	10,000	8732	8600 gpm is used in the EPU safety analyses
CS Pump Flow Rate Long Term Cooling (gpm)	3125	3493	3125 gpm is used in the EPU safety analyses.
RHR Heat Exchanger Heat Transfer Capacity (K, BTU/sec-°F) per HX	270	305/500	305 up to one hour and 500 after one hour when flow is split between 2 RHR HXs.
Source for HPCI	Suppression Pool	Suppression Pool	SSLB Only

Table 9-2b
Key Changes in Inputs to NPSH Calculations for EPU

Loss of RHR Normal Shutdown Cooling with Loss of Offsite Power

	CLB (Note 1)	EPU	Notes
SP Initial Temperature (°F)	~~9~~**295**	95	TS 3.6.2.1 limit
SP Initial Volume, ft^3	122,900	122,900	TS 3.6.2.2 low limit
DW Initial Temperature (°F)	145	70	145 °F is the TS 3.6.1.4 limit. Initial conditions for EPU (70 °F) are assumed that maximize suppression pool temperature while also maximizing containment pressure response.
UHS Temperature (°F)	92	92	TS 3.7.2 limit.
Credit for Passive Heat Sinks	No	Yes	EPU for long term with no heat loss through containment walls.
Number of Pumps/RHR Heat Exchangers for LT Cooling	1/1	1/2	At EPU, the operating RHR pump is cross tied to 2 RHR heat exchangers.
RHR Pump Flow Rate Long Term Cooling (gpm)	10,000	8732	8600 gpm is used in the EPU safety analyses.
CS Pump Flow Rate Long Term Cooling (gpm)	~~NA~~ **3125**	3493	3125 gpm is used in the EPU safety analyses.
RHR Heat Exchanger Heat Transfer Capacity (K, BTU/sec-°F) per HX	270	305/500	305 up to one hour and 500 after one hour when flow is split between 2 RHR HXs for loss of offsite power.
Source for HPCI	Suppression Pool	Suppression Pool	

Note 1: CLB parameters for the Loss of RHR NSDC event are based on the Containment analysis.

Table 9-2c
Key Changes in Inputs to NPSH Calculations for EPU

SRVT

	CLB	EPU	Notes
SP Initial Temperature (°F)	~~95~~**95**	95	TS 3.6.2.1 limit
SP Initial Volume, ft^3	122,900	122,900	TS 3.6.2.2 low limit
DW Initial Temperature (°F)	~~145~~ **N/A**	~~70~~ **N/A**	~~145 °F is the TS 3.6.1.4 limit. Initial conditions for EPU (70 °F) are assumed that maximize suppression pool temperature while also maximizing containment pressure response.~~ **DW temperatures are not required to be modeled for the limiting SRVT analysis.**
UHS Temperature (°F)	92	92	TS 3.7.2 limit
Credit for Passive Heat Sinks	No	No	
Number of RHR Pumps/Heat Exchangers for LT Cooling	1/1	1/2	At EPU, the operating RHR pump is cross tied to 2 RHR heat exchangers.
RHR Pump Flow Rate Long Term Cooling (gpm)	10,000	8732	8600 gpm is used in the EPU safety analyses
CS Pump Flow Rate Long Term Cooling (gpm)	3125	3493	3125 gpm is used in the EPU safety analyses.
RHR Heat Exchanger Heat Transfer Capacity (K, BTU/sec-°F) per HX	270	305/500	305 up to one hour and 500 after one hour when flow is split between 2 RHR HXs for loss of offsite power.
Source for HPCI	CST	CST	Limiting Case (1A)

Table 9-2d
Key Changes in Inputs to NPSH Calculations for EPU

SBO

	CLB	EPU	Notes
SP Initial Temperature (°F)	~~9295~~	86	Change to nominal value for EPU from TS limit. The EPU value is the mean plus one standard deviation of a statistical analysis of a five year sampling of data.
SP Initial Volume, ft^3	122,900	125,100	Changed **EPU analysis input value** from TS limit to nominal value for EPU.
DW Initial Temperature (°F)	145	145	145 is the TS 3.6.1.4 limit.
UHS Temperature (°F)	92	86	The EPU value is the mean of a statistical analysis of a five year sampling of data for the months of June, July, August, and September.
Credit for Passive Heat Sinks	Yes	Yes	EPU for long term with no heat loss through containment walls.
Number of RHR Pumps/Heat Exchangers for LT Cooling	1/1	1/1	At one hour, Alternate AC is available and one RHR pump and one RHR Heat Exchanger placed in service.
RHR Pump Flow Rate Long Term Cooling (gpm)	10,000	8732	8600 gpm is used in the EPU safety analyses.
CS Pump Flowrate Long Term Cooling (gpm)	NA	NA	
RHR Heat Exchanger Heat Transfer Capacity (K, BTU/sec-°F) per HX	270	305	
Source for HPCI/RCIC	Suppression Pool	CST	

Table 9-2e
Key Changes in Inputs to NPSH Calculations for EPU

ATWS

	CLB	EPU	Notes
SP Initial Temperature (°F)	~~95~~**95**	86	Change to nominal value for EPU from TS limit. The EPU value is the mean plus one standard deviation of a statistical analysis of a five year sampling of data.
SP Initial Volume, ft^3	122,900	~~122,900~~**125,100**	~~TS 3.6.2.2 low limit~~ **Changed EPU analysis input value from TS limit to nominal value for EPU**
DW Initial Temperature (°F)	NA	NA	There is no LOOP and no loss of containment cooling.
UHS Temperature (°F)	92	86	The EPU value is the mean of a statistical analysis of a five year sampling of data for the months of June, July, August, and September.
Credit for Passive Heat Sinks	No	No	
Number of RHR **Pumps/**Heat Exchangers **for LT Cooling**	2/2	2/2	
RHR Pump Flow Rate Long Term Cooling (gpm)	10,000	8732	8600 gpm is used in the EPU safety analyses.
CS Pump Flow Rate Long Term Cooling (gpm)	NA	NA	
RHR Heat Exchanger Heat Transfer Capacity (K, BTU/sec-°F) per HX	270	305	610 total heat exchanger effectiveness per loop.
Source for HPCI	~~Suppression Pool~~ **CST**	CST	

Table 9-2f
Key Changes in Inputs to NPSH Calculations for EPU

Appendix R Fire Safe Shutdown Events

	CLB	EPU	Notes
SP Initial Temperature (°F)	~~92~~**80**	86	Change to nominal value for EPU ~~from TS Limit~~. The EPU value is the mean plus one standard deviation of a statistical analysis of a five year sampling of data.
SP Initial Volume, ft^3	122,900	125,100	Changed **EPU analysis input value** from TS limit ~~for CLB~~ to nominal value for EPU.
DW Initial Temperature (°F)	145	135	Changed **EPU analysis input value** to nominal value **for EPU** from TS limit.
UHS Temperature (°F)	~~92~~**90**	86	The EPU value is the mean of a statistical analysis of a five year sampling of data for the months of June, July, August, and September
Credit for Passive Heat Sinks	No	Yes	EPU for long term with no heat loss through containment walls.
Number of RHR **Pumps/**Heat Exchangers **for LT Cooling**	1**/1**	1**/1**	
RHR Pump Flow Rate Long Term Cooling (gpm)	10,000	8732	8600 gpm is used in the EPU safety analyses.
CS Pump Flow Rate Long Term Cooling (gpm)	3125	3493	Appendix R Case C1A. 3125 gpm is used in the safety analyses.
RHR Heat Exchanger Heat Transfer Capacity (K, BTU/sec-°F)	~~270~~**244.5**	305	
Source for HPCI/RCIC	~~Suppression Pool~~ **N/A** Note 1	CST	

Note 1: CLB analysis does not differentiate or restrict HPCI/RCIC system pump suction sources.

Table 9-4
SUMMARY OF MODIFICATIONS THAT IMPROVE NPSH MARGIN

Modification (EPU LAR Description)	ECCS Pump NPSH – Events	Proposed Changes
RHR Heat Exchanger Cross-Tie (Enclosure 9C)	DBA-LOCA Short term (first 10 minutes)	• Reduce RHR runout flow rate by adding hydraulic resistance with flow control valves
RHR Heat Exchanger Cross-Tie (Enclosure 9C) HPSW Cross-Tie (Enclosure 9D)	DBA-LOCA Long term and SSLB	• Cross Tie second RHR HX to operating RHR pump • Improve RHR performance (reduce allowable fouling) • Decrease RHR flow rate
RHR Heat Exchanger Cross-Tie (Enclosure 9C) CST (Enclosure 9E)	SBO	• Improve RHR performance (reduce allowable fouling) • Decrease RHR flow rate • Credit CST as suction source for HPCI and RCIC pumps
RHR Heat Exchanger Cross-Tie (Enclosure 9C) SLC System (Enclosure 9B) CST (Enclosure 9E)	ATWS	• Improve RHR performance (reduce allowable fouling) • Decrease RHR flow rate • Increase B-10 enrichment • Credit CST as suction source for HPCI pumps
RHR Heat Exchanger Cross-Tie (Enclosure 9C) CST (Enclosure 9E)	Appendix R	• Improve RHR performance (reduce allowable fouling) • Decrease RHR flow rate • Increase CST inventory • HPCI and RCIC pumps use CST only
RHR Heat Exchanger Cross-Tie (Enclosure 9C) HPSW Cross-Tie (Enclosure 9D)	Loss of RHR NSDC	• Cross Tie second RHR HX to operating RHR pump • Improve RHR performance (reduce allowable fouling) • Decrease RHR flow rate
RHR Heat Exchanger Cross-Tie (Enclosure 9C) CST (Enclosure 9E)	SRVT	• Improve RHR performance (reduce allowable fouling) • Decrease RHR flow rate • ~~CST as suction source for HPCU pumps~~

Non-Proprietary Information – Class I (Public)

Attachment 10

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

Response to Request for Supplemental Information
Issue 2, Steam Dryer Analysis

NRC Issue 2 – Steam Dryer Analysis

In accordance with the second and fifth criteria ("Sufficiency of Information" and "Use of Precedent") in Section 3.1.2 of Appendix B to Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-109, Revision 1, "Acceptance Review Procedures" (ADAMS Accession No. ML091810088), the NRC staff in NRR's Mechanical and Civil Engineering Branch (EMCB) has determined that the PBAPS EPU license amendment request (LAR) is unacceptable for review, pending submittal of supplemental information pertaining to the steam dryer analysis. The NRC staff has reached this conclusion based on the following: (1) the issues identified below represent significant, obvious deficiencies with the information and analyses provided to support the LAR and would generate an inordinate amount of requests for additional information (RAIs); (2) the precedent licensing actions, cited throughout the documents enclosed in Attachment 17 to the LAR submittal, including the [[

]] are not directly applicable to the PBAPS EPU steam dryer evaluations. As such, the licensee must provide sufficient and adequate justification for citing information and analyses related to these precedents. These issues are discussed in detail, below, and are primarily related to NRC staff experience with previous EPU LARs.

[[

]]

As discussed in the LAR, the licensee evaluated the existing PBAPS original equipment manufacturer's steam dryers and determined the steam dryers would not be suitable for EPU conditions without modifications. As such, the licensee has decided to replace the original steam dryers with Westinghouse designed and manufactured Nordic steam dryers. For the PBAPS replacement steam dryers (RSDs), [[

]] The effect of these design differences [[

]] needs to be addressed. The specific supplemental information needed is delineated below.

EMCB Supplemental Information Request 1

As discussed in Section 4.2 of Attachment 1 to the LAR, the RSDs for PBAPS will use the Acoustic Circuit Model (ACM) Revision 4.1 methodology for the steam dryer analysis. Tables 3-2, 3-3, and 3-4 of Attachment 17, Enclosure 17B.1 (WCAP-17590-P, "Peach Bottom Units 2 & 3 Replacement Steam Dryer Acoustic Load Definition," Revision 0), to the LAR show [[

]] Based on the information submitted in the application, the NRC staff finds the use of [[ ]] unacceptable.

Since the use of Nordic design-type steam dryer in U.S. boiling water reactors is relatively new, and the experience in estimating the pressure loads acting on it is very limited, the licensee should establish [[

.]] The licensee should either provide these [[ ]] or provide further, technically sound justification for using [[

.]]

Response

Exelon Generation Corporation, LLC (EGC) understands the staff's request to provide further information since our application includes a relatively new design replacement steam dryer (RSD). EGC provides the following background information which describes the bases for our licensing approach, including a description of how we conform to the NRC guidance that pertains to RSD's, and also provides further, technically sound justification for using [[ ]]^{a,c}

Background

Regulatory Guide (RG) 1.20 Rev 3, March 2007, "Comprehensive Vibration Assessment program for Reactor Internals During Preoperational and Initial Startup Testing" identifies the methodology that the NRC considers acceptable specifically as it relates to ensuring structural integrity of steam dryers in support of power uprates (RG 1.20 R3, Section B, "Discussion"). This guide presents a comprehensive vibration assessment program that includes individual analytical, measurement, and inspection programs. The RG describes that individual analytical, measurement, and inspection programs should be used cooperatively to verify structural integrity and to establish the margin of safety. Specifically, the analytical program should be used to provide theoretical verification of structural integrity, and should also be the basis for the choice of components and areas to be monitored in the measurement and inspection programs. The measurement program should be used to confirm the analysis, but the program (i.e., data acquisition, reduction, and interpretation processes) should be sufficiently flexible to permit definition of any significant vibratory modes that are present but were not included in the analysis (RG 1.20 R3, Section B, "Discussion"). Attachment 17 of our September 28, 2012 application is consistent with the comprehensive vibration assessment program described in RG 1.20.

EGC designated the PBAPS Unit 2 RSD as a "prototype" per RG 1.20 and will instrument this steam dryer to obtain direct measurements of the loads on it.

EGC designated the PBAPS Unit 2 RSD as a "prototype" because there are no other Nordic-design steam dryers approved for EPU and could not justify other Nordic-design dryers in operation as a prototype. This includes the Nordic-design steam dryer installed at the Monticello Nuclear Generating Station. EGC did not consider the PBAPS RSDs to have substantially the same arrangement, size, and operating conditions as the Monticello RSD to be classified as "non-prototype, category 1." In particular, at EPU conditions, the PBAPS Units will be rated at 3951 MWt whereas the Monticello unit will be rated at 2004 MWt. The PBAPS units will operate with a steam flow of 16.1 Mlb/hr whereas the Monticello unit will operate with a steam flow of 8.34 Mlb/hr. The inside diameter of the PBAPS reactor vessels is 251 inches whereas the inside diameter of the Monticello reactor vessel is 206 inches.

Given these differences between the Monticello and PBAPS units that precluded EGC from considering the Monticello RSD substantially the same as the PBAPS RSDs, it is not apparent to EGC that taking into account the [[ ]]$^{a, c}$ Accordingly, EGC followed the [[ ]] to predict the loads on the PBAPS RSDs.

Also, the Monticello dryer measurement data is the property of Xcel Energy and currently not available to EGC.

Nevertheless, if the Monticello RSD measurement data becomes available to EGC, we will consider how this data may be compared to the PBAPS [[ ]]$^{a, c}$ and provide the results during the NRC technical review of our application.

In addition, EGC will use the direct dryer measurements from the instrumentation on the PBAPS Unit 2 RSD to demonstrate the correlation of ACM 4.1 predictions to the actual measured RSD data prior to exceeding Current Licensed Thermal Power (CLTP) for PBAPS Unit 2.

Justification

EGC understands the concern with applying the appropriate [[ ]]$^{a, c}$ to determine the predicted steam dryer response. As noted in our submittal, EGC has used ACM Version 4.1 as the analytical tool for generating predicted acoustic loads acting on the steam dryer. ACM 4.1 was not developed based on a specific dryer geometry and was expected to be applicable to any steam dryer geometries (BWRVIP 194 section 6.7). The [[ ]]$^{a, c}$, which are based upon the [[ ]]$^{a, c}$, are reported in Table 3-2 of WCAP-17590-P (Reference 2).

Since the standpipe resonance responses are expected to have the largest impact on the structural integrity of the steam dryer, the strategy used in the PBAPS analysis was to ensure that the [[ ]]$^{a, c}$ associated with these frequencies would be conservative and bounding. Use of the [[ ]] , supports this strategy.

In Table 3-4 of WCAP-17590-P (Reference 2) it can be seen the [[ ]]$^{a, c}$ is conservatively set at [[ ]]$^{a, c}$ for the Target Rock, Dresser and blind standpipe resonances. This [[ ]]$^{a, c}$ results in effectively multiplying the ACM 4.1 [[ ]]$^{a, c}$

The development of the [[ ]]^{a,c} used in the PBAPS analysis is based on the [[ ]]^{a,c} of the standpipe resonance frequencies discussion in the RAI responses to questions on the BWRVIP-194 (BWRVIP Response to NRC RAI BWRVIP194-EMCB-RAI-01, LTR-A&SA-11-47-P) and is summarized as follows:
[[

]]^{a,c}

EGC considers this amplification as more than adequate to capture the effects of acoustic resonance due to the standpipes for the PBAPS RSDs and thus ensure the overall structural integrity of the steam dryer. EGC also considers this amplification to be totally dependent upon the type of standpipe acoustic resonance while totally independent of the type of steam dryer [[ ]]^{a,c}. Finally, while EGC will instrument and measure the RSD, the high cycle fatigue analysis also includes a minimum stress ratio of 2.0 which provides an added conservatism.

Direct Measurement

In addition to using the PBAPS Unit 2 RSD direct dryer instrumentation data at EPU to confirm the predicted loads described in Attachment 17, Enclosure B.4U2 of the original submittal (Reference 5), EGC will use the PBAPS Unit 2 direct dryer measurements to evaluate and confirm the conservatism in the predicted ACM 4.1 results prior to exceeding CLTP. These measurements and evaluations will verify that the analytical methods utilized have conservatively accounted for any [[ ]]^{a,c}, thus ensuring structural integrity of the PBAPS RSD.

Conclusion

In conclusion, our approach is consistent with RG 1.20 with respect to new designs. Since no data is available that can be directly extrapolated to the PBAPS RSD's, our analysis conservatively applied the available [[ ]] [a, c] and assured a bounding conservative analytical response for the major impact to steam dryer structural integrity (i.e., standpipe resonances). The PBAPS analysis also applied a minimum stress ratio of 2.0 adding additional margin. Finally, through direct dryer measurement of the PBAPS Unit 2 RSD, we will be able to demonstrate the conservatism in this approach prior to exceeding CLTP. Based on this additional justification, our conclusion is that the approach described in our September 28, 2012, submittal is applicable and appropriate to ensure structural integrity of the RSD's for PBAPS.

EMCB Supplemental Information Request 2

Table 3-3 of Attachment 17, Enclosure 17B.1 (WCAP-17590-P), to the LAR shows [[

]] The licensee should address design and modeling considerations to justify the proposed approach.

Response

As noted in the U. S. Nuclear Regulatory Commission request, the ANSYS model solution [[

]] (BWRVIP-194 report, Section E.4). The [[

]]. Accordingly, it is EGC's position that the specific dimensions and design of the dryer are not considered critical attributes for this [[ ]], and that the [[ ]] is applicable to general welded structures, including other steam dryer designs, of similar complexity and modeled with the same type of elements (predominantly shell elements) and comparable mesh spacing. Additionally, modeling changes incorporated since [[ ]], including submodeling and use of [[ ]]^{a,} would improve upon this [[ ]]. Thus, it was concluded that the [[ ]] was conservative and appropriate for use in the PBAPS RSD qualification.

EGC provides the following justification as the basis that the [[ ]] are applicable to the evaluation performed for the PBAPS replacement steam dryer:

The PBAPS RSD dryer qualification also used the ANSYS computer code, using predominantly shell element types and a mesh spacing that was comparable with the [[ ]].

A review of the PBAPS RSD analysis did identify that the manner in which solid and shell elements are connected differed from that used in the [[ ]]. The PBAPS RSD analysis used the [[ ]]$^{a, c}$, which is a preferred approach with ANSYS. However the original [[ ]], used an approach where the edge of the shell element was embedded into the solid element. While it was expected that the element connectivity method would not have a significant impact on the analytical results, to validate this conclusion, the [[ ]] was recently re-run by EGC with the FEA model revised to substitute [[ ]] for the embedded interface. The results from this study supported the conclusion that the element connectivity approach had minor impact on results and revealed that the uncertainty term improved from [[ ]]$^{a, c}$ (Reference 2, Table 3-3) to [[ ]]$^{a, c}$. However, it should be noted that the PBAPS dryer design utilized the more conservative [[ ]]$^{a, c}$ from the [[ ]].

Independently, Westinghouse recently completed a study using the PBAPS RSD model as its basis where the ANSYS shell paste (i.e., SP or painted shell) method versus the [[ ]]^{a,c} was compared. As discussed above, the modeling done for the PBAPS submittal utilized the [[ ]]^{a,c} The results of this study indicated that, using the SP method as a baseline, the difference in the displacement response of the steam dryer was [[ ]]^{a,c} The agreement was even closer in the steam dryer stress intensity results with the difference being [[ ]]^{a,c} This study further supports the conclusion that that the [[ ]]^{a,c} has only a minor effect on the analytical results when compared to other connectivity methods.

As noted above, the global finite element model (FEM) for the PBAPS RSD was predominantly modeled using shell elements. This resulted in a few geometrically complex design areas being simplified in the global shell model. A mesh spacing was used that could accurately predict the dynamic characteristics of the structure, but required some additional analysis for localized regions of high stress. Submodeling was utilized to model more detailed and complex geometry with either shell or solid elements, while also being used in areas where a finer mesh density was needed to analyze a localized region of high stress.

With respect to the [[ ]], submodeling was neither performed in the original analyses nor in the updated analysis. However, if submodeling was used in that study, the [[ ]] would generally be reduced since submodeling models local weld details and uses a finer mesh spacing.

Direct Measurement

In addition to using the PBAPS U2 RSD direct dryer instrumentation data at EPU to confirm the predicted loads described in Attachment 17, Enclosure B.4U2 of the original submittal (Reference 5), EGC will use the Unit 2 direct dryer measurements to evaluate and confirm the conservatism in the predicted ACM 4.1 results prior to exceeding CLTP. These measurements and evaluations will verify that the analytical methods utilized have conservatively accounted for any [[ ]], thus ensuring structural integrity of the PBAPS RSD.

Conclusion

It is EGC's conclusion that the [[shaker test uncertainty factors]] used in the PBAPS RSD analysis are applicable and appropriate. [[Uncertainties developed utilizing the HCGS dryer]] have been re-evaluated for the PBAPS RSD analysis specific details and shown to be conservative and to have a minor impact on the results. Additionally, the ANSYS modeling technique of [[ ]]^{a,c} versus other connectivity methods demonstrated that using [[ ]]^{a,c} would have a minor impact on results. Therefore, it is demonstrated that the [[ ]] and FEM details, used for the PBAPS RSD dryer analyses are conservative and appropriate for this application.

EMCB Supplemental Information Request 3

Tables 5-3, 5-4 and 5-6 of Attachment 17, Enclosure 17B.6 (WCAP-17626-P, "Processing of Peach Bottom Unit 2 and Unit 3 MSL Strain Gauge Data and Computation of Predicted EPU Signature," Revision 0), to the LAR indicate that [[
]] The NRC staff finds this unacceptable and notes that the
[[

]] Therefore, the NRC staff requests the licensee to consider the [[ ]] in the steam dryer evaluation and provide the revised assessment of the dryer which considers these effects.

Response

As part of the development of the acoustic load response, [[

]] It was EGC's position that the [[ ]] to dryer loading was small and that it was inherently included in the conservatism built into the analysis (e.g., maintaining a stress ratio (SR) greater than 2.0) and that the direct dryer measurements being performed for PBAPS Unit 2 would validate this conclusion. Based on feedback from the U. S. Nuclear Regulatory Commission during clarification calls, EGC performed a quantitative assessment to evaluate the [[ ]] to the replacement steam dryer (RSD) loading. The analytical approach as discussed below was performed and is consistent with the approach discussed during the December 17, 2012, clarification call.

To conservatively quantify the [[ ]] upon the RSD, [[ ]] was developed consisting of [[

]]

First, [[ ]]
and was used as the basis for conservative input to the [[ ]] The data was obtained from [[
]]

The [[
]] The purpose of the [[

]] That is, the [[
]]

[[

]]

To account for the [[

]]

The second part of the analysis was to apply [[ ]] calculated above to the [[ ]] and calculate RSD [[ ]] stresses.

[[

]]

Summary of Results

The results of this conservative [[ ]] determined that the maximum [[ ]] stress is [[ ]] [a, c] and occurs on the [[ ]] [a, c] Additionally, at the limiting stress location [[ ]] [a, c] of Attachment 17, Enclosure 17B.2 of the original submittal (Reference 6)), the resultant stress was determined to be only [[ ]] [a, c] This value is small [[ ]] [a, c] when compared to the maximum [[ ]] reported in this referenced table. Additionally, when the [[ ]], all stress ratios remain greater than 2.0.

Comparison of Results Against Available Data

Since no direct dryer data is available for the PBAPS units, specific benchmarking of the conservatisms in the above described [[ ]] could not be performed. However, direct dryer strain measurements do exist for [[ ]] Although not identical, a comparison between the PBAPS and the [[ ]] was considered relevant to assess the relative magnitude of resultant stresses and thus provides valuable insight to potential [[ ]] impacts.

The [[ ]] provided values on the same order of magnitude with the PBAPS [[ ]] described above, where the [[ ]]

To further evaluate this appropriateness of [[ ]] EGC will use the PBAPS Unit 2 direct dryer measurements to evaluate and confirm the conservatism in the predicted ACM 4.1 results prior to exceeding CLTP which will include the [[ ]] on the PBAPS Unit 2 dryer.

Conclusion

A conservative [[ ]] was developed to assess the potential impact of [[ ]] on the structural integrity of the PBAPS RSD.

Based on the quantitative assessment and comparison with the direct dryer data from [[ ]] it is EGC's conclusion that the effect due to [[ ]] is small in comparison to other evaluated loads and is included within the inherent conservatisms in the RSD modeling. This position will be confirmed through PBAPS specific direct dryer instrumentation prior to exceeding CLTP.

Specifically, in addition to using the PBAPS Unit 2 RSD direct dryer instrumentation data at EPU to confirm the predicted loads described in Attachment 17, Enclosure B.4U2 of the original submittal (Reference 5), EGC will use the PBAPS Unit 2 direct dryer measurements to evaluate and confirm the conservatism in the predicted ACM 4.1 results prior to exceeding CLTP. These measurements and evaluations will verify that the analytical methods utilized have conservatively accounted for any [[

]] thus ensuring structural integrity of the PBAPS RSD.

References

1. Westinghouse Report WCAP-17611-P, Rev. 1, "Peach Bottom Units 2 & 3 Replacement Steam Dryer Four-Line Subscale Acoustics Test Data Evaluation and Derivation of CLTP-to-EPU Scaling Spectra," August 2012. (Westinghouse Proprietary)
2. Westinghouse Report WCAP-17590-P, Rev 0, "Peach Bottom Units 2&3 Replacement Steam Dryer Acoustic Load Definition," August 2012. (Westinghouse Proprietary)
3. BWRVIP Response to NRC RAI BWRVIP194-EMCB-RAI-01, LTR-A&SA-11-47-P. (Westinghouse Proprietary)
4. Westinghouse Report WCAP -17635-P, Rev.1, "Peach Bottom Atomic Power Station Unit 2 and Unit 3 Replacement Steam dryer Comprehensive Vibration Assessment Program (CVAP)," September 2012. (Westinghouse Proprietary)
5. Westinghouse Report WCAP-17654-P, Rev 2, "Peach Bottom Unit 2 Replacement Steam Dryer Power Ascension Program Description for Extended Power Uprate," September 2012. (Westinghouse Proprietary)
6. Westinghouse Report WCAP-17609-P, Rev. 1, "Peach Bottom Units 2 and 3 Replacement Steam Dryer Structural Evaluation for High-Cycle Acoustic Loads," September 2012. (Westinghouse Proprietary)

Attachment 11

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

WEC Affidavit for Withholding Information Executed by WEC for Attachment 9

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CAW-13-3622

February 14, 2013

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: Attachment 9 "Response to Request for Supplemental Information, Issue 2, Steam Dryer Analysis," (Proprietary) attached to Exelon Generation submittal to the NRC "Supplemental Information and Corrections Supporting Request for License Amendment Request - Extended Power Uprate – Supplement No. 1"

The proprietary information for which withholding is being requested in Attachment 9 of Exelon Generation's submittal is further identified in Affidavit CAW-13-3622 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Exelon Generation.

Correspondence with respect to the proprietary aspects of the application for withholding or the accompanying affidavit should reference CAW-13-3622 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

Bradley F. Maurer, Manager
ABWR Licensing

Enclosures

CAW-13-3622

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared Bradley F. Maurer, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

Bradley F. Maurer, Manager
ABWR Licensing

Sworn to and subscribed before me
this 14th day of February 2013

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Anne M. Stegman, Notary Public
Unity Twp., Westmoreland County
My Commission Expires Aug. 7, 2016
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

(1) I am Manager, ABWR Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's

competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in Attachment 9 "Response to Request for Supplemental Information, Issue 2, Steam Dryer Analysis," (Proprietary) attached to Exelon Generation submittal to the NRC "Supplemental Information and Corrections Supporting Request for License Amendment Request - Extended Power Uprate – Supplement No. 1", for submittal to the Commission, being transmitted by Exelon Generation letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is to assist the NRC in their review of the Peach Bottom Atomic Power Station, Units 2 and 3, License Amendment Request for Extended Power Uprate and may be used only for that purpose.

This information is part of that which will enable Westinghouse to:

(a) Assist Exelon Generation in obtaining NRC review of the Peach Bottom Atomic Power Station Units 2 and 3 License Amendment Request.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of this information to its customers for purposes of plant specific replacement steam dryer analysis for licensing basis applications.

(b) Its use by a competitor would improve their competitive position in the design and licensing of a similar product for BWR steam dryer analysis methodology.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar technical evaluation and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

Proprietary Information Notice

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with a request to assist the NRC in the review of the Peach Bottom Atomic Power Station, Units 2 and 3, License Amendment Request for Extended Power Uprate.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

Copyright Notice

Attachment 12

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

EGC Affidavit for Withholding Information Executed by EGC for Attachment 9

AFFIDAVIT

I, Craig W. Lambert, Vice President Power Uprates, Exelon Generation Company, LLC (Exelon), do hereby affirm and state:

1. I am an officer of Exelon authorized to execute this affidavit on its behalf. I am further authorized to apply for the withholding of information from disclosure.

2. The information sought to be withheld is:

   i) " Response to Request for Supplemental Information Issue 2, Steam Dryer Analysis," dated February 15, 2013.

3. This information constitutes proprietary information that should be held in confidence by the NRC pursuant to the policy reflected in 10 CFR 2.390(a)(4), because:

   i. This information is marked as "Proprietary Information in Accordance with 10 CFR 2.390" and is being held in confidence by Exelon.

   ii. This information is of a type that is held in confidence by Exelon, and there is rational basis for doing so because the information contains methodology, data, and supporting information identified as "Proprietary Information."

   iii. This information is being transmitted to the NRC in confidence.

   iv. This information sought to be withheld, to the best of my knowledge and belief, is not available in public sources and no public disclosure has been made.

   v. Public disclosure of this information could create substantial harm to Exelon's business interests because it expended considerable resources in developing and protecting the information.

4. Accordingly, Exelon requests that the designated document be withheld from public disclosure pursuant to the policy reflected in 10 CFR 2.390(a)(4).

OFFICIAL SEAL
LAURA E. BORVAN
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES APR. 29, 2014

Craig W. Lambert
Vice President Power Uprates
Exelon Generation Company, LLC

Subscribed and sworn before me,
A Notary Public in and for the
State of Illinois
this 14 day of Feb 2013