Exelon Generation.

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U. S. Nuclear Regulatory Commission
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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 Supporting Request for License Amendment Request - Extended Power Uprate – Supplement No. 5

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. U.S. Nuclear Regulatory Commission to Exelon Generation dated April 26, 2013; Peach Bottom Atomic Power Station – Units 2 and 3 – Request for Additional Information for Extended Power Uprate (TAC Nos. ME9631 and ME9632). (ML13106A126)

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 (PBAPS), Units 2 and 3, respectively. Specifically, the proposed changes revise the Operating License and Technical Specifications (TS) to implement an increase to 3951 MWt from the current licensed reactor thermal power (CLTP) of 3514 MWt.

In this supplement, EGC proposes changes to the proposed TS submitted in Reference 1. These changes include 1) new TS surveillance requirements (SR) to verify the capability to transfer power sources for selected valves and 2) revisions to TS related to the Oscillating Power Range Monitors (OPRM).

The original license amendment request (LAR) described modifications to enable PBAPS to eliminate the need to credit containment accident pressure (CAP) in its evaluation of net positive suction head for the emergency core cooling system (ECCS) pumps. During the detailed design, it was determined that certain changes to the modifications described in Reference 1 that support CAP credit elimination are necessary. The Residual Heat Removal (RHR) Heat Exchanger Cross-Tie Modification ("RHR Modification"), as described in Enclosure 9c of Reference 1, will be changed to provide the control room operator with the capability to transfer power for certain selected valves from a normal source to an alternate source in the event of a loss of offsite power and failure of an emergency AC electrical power source. This change requires additional SRs to ensure this function.

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The revisions to the proposed OPRM TS affect the Reactor Protection System Instrumentation TS changes included in Reference 1. The revision proposes to align the operability requirement for the OPRM Upscale function with the requirement for the calibration of the Average Power Range Monitors (APRM) at EPU conditions.

A design change will also be made to allow the operator to prevent the automatic swapover of the suction of the High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) pumps for certain events including fires in certain fire areas.

This supplement includes a description of these changes, including changes to related descriptions from Attachments 4, 6, and 9 of Reference 1.

Finally, this supplement provides additional editorial corrections and clarifications to the Reference 1, Attachments 4 and 6.

The attachments to this supplement are summarized as follows:

Attachment 1 Provides proposed TS changes and a description of the changes to the modifications described in Reference 1 supporting CAP credit elimination, OPRM TS changes, revisions to the human factors evaluation and minor editorial changes to Reference 1.

Attachment 2 Provides replacement marked up pages of the affected TS indicating the changes proposed in this supplement. They are shaded to distinguish them from the changes proposed in Reference 1.

Attachment 3 Provides replacement marked up pages of the affected TS Bases indicating the changes proposed in this supplement. They are shaded to distinguish them from the changes proposed in Reference 1. These pages are provided for information only and do not require NRC approval.

Attachment 4 Provides a revision to Reference 1, Attachments 4 and 6, Section 2.11, Human Performance, reflecting the results of a human factors evaluation due to the changes. This attachment also provides additional information requested by the Health Physics and Human Performance Branch (Reference 2).

EGC has reviewed the information supporting a finding of no significant hazards consideration and the environmental consideration in Reference 1. The additional information provided in this supplement does not affect the bases for concluding that no significant hazards consideration is involved with the proposed EPU license amendment. Further, the additional information provided in this supplement does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the Commonwealth of Pennsylvania and the State of Maryland of this supplement by transmitting a copy of this letter 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 27th day of June 2013.

Respectfully,

Kevin F. Borton
Manager, Licensing - Power Uprate

Attachments:
1. Evaluation of Proposed Changes
2. Replacement Markups of Technical Specification Pages for Units 2 and 3
3. Replacement Markups of Technical Specification Bases Pages for Units 2 and 3
4. Replacement Text for Section 2.11 in Attachments 4 and 6 of PBAPS EPU LAR Submitted September 28, 2012

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
S. T. Gray, State of Maryland

Attachment 1

Peach Bottom Atomic Power Station Units 2 and 3

Supplement No. 5 to Extended Power Uprate License Amendment Request

NRC Docket Nos. 50-277 and 50-278

Evaluation of Proposed Changes

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1.0 INTRODUCTION

Exelon Generation Company, LLC (EGC) submitted a License Amendment Request (LAR) for an Extended Power Uprate (EPU) for the Peach Bottom Atomic Power Station (PBAPS) Units 2 and 3 on September 28, 2012 (Reference 1). During the detailed design process, changes to the modifications described in Reference 1 that support Containment Accident Pressure (CAP) credit elimination were identified. These include the need to provide the operator with the capability to transfer the source of power for the motor-operated valves required to establish the Residual Heat Removal (RHR) system in a cross-tied configuration from a normal to an alternate source and the ability to inhibit the automatic swapover of the suction of the High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) pumps from the Condensate Storage Tank to the suppression pool for certain events. These changes necessitated additional Technical Specifications (TS) changes. A change to the Oscillation Power Range Monitor (OPRM) TS to provide coordination with related TS requirements was also identified. Finally, minor corrections and clarifications to Attachments 4 and 6 of the EPU LAR (i.e., the Power Uprate Safety Analysis Report, PUSAR) were identified. This supplement provides the additional information related to these changes necessary to support the U.S. Nuclear Regulatory Commission's (NRC) review of the EPU LAR.

The safety analyses included in the EPU LAR support the elimination of reliance on CAP credit in demonstrating Net Positive Suction Head (NPSH) for the Emergency Core Cooling System (ECCS) pumps. The EPU LAR described certain modifications that will accomplish the elimination of CAP credit. Among these modifications is the RHR Heat Exchanger Cross-Tie Modification (RHR Modification) as described in Enclosure 9c to Attachment 9 of Reference 1. Since the submittal of Reference 1, the detailed design process identified the need to provide the Control Room operator with the capability to transfer the power supply of the motor-operated RHR cross-tie, RHR flow control and RHR heat exchanger High Pressure Service Water (HPSW) outlet valves from a safety-related normal source to a safety-related alternate source in the event of a loss of offsite power and the failure of an emergency AC electrical source. These changes are described in Section 2.1 below and include the proposed additional changes to the TS Surveillance Requirements (SR) that will verify operability of the alternate power transfer switch function; a revision to Enclosure 9c of Attachment 9 reflecting these changes; and the results of an evaluation of their impact on overall plant risk.

The EPU LAR described modifications supporting the elimination of CAP credit that include establishing the Condensate Storage Tank (CST) as the only suction source for HPCI and RCIC pumps during certain special events. This modification is described in Enclosure 9e, Condensate Storage Tank Modifications, of Attachment 9 of Reference 1. The detailed design process also identified the need to provide key-lock switches that will allow the operator to inhibit the automatic swapover of the suction source for these pumps for a fire in certain fire areas. This modification change is described in Section 2.5 below.

The changes to the RHR Modification and the use of key-lock switches for inhibiting automatic swapover of the suctions for the HPCI and RCIC pumps impact operator actions. The resulting revisions to the procedures governing affected operator actions are addressed in Section 3.0 below and are incorporated into a revision of PUSAR Section 2.11, Human Performance, provided as Attachment 4 to this supplement. The effects of the changes described in this supplement on the responses provided in Requests for Additional Information (RAI) AHPB-RAI-1, 2 and 3 provided in Reference 5 are also addressed in Section 3.0 below.

Section 4.0 of this supplement proposes a revision to TS 3.3.1.1, Reactor Protection System Instrumentation, that would revise the power level at which the OPRM Upscale function is required to be operable in order to align with the calibration of the Average Power Range Monitors (APRMs) at EPU conditions.

Finally, Section 5.0 provides additional minor corrections and clarifications to the PUSAR as submitted in the EPU LAR.

2.0 CHANGES TO SUPPORT CAP CREDIT ELIMINATION

2.1 Description of Changes to RHR Heat Exchanger Cross-tie Modification

The proposed EPU design basis analysis assumes that the RHR system is placed into a cross-tied configuration consisting of one RHR pump with flow balanced through two heat exchangers at one hour into the event. In order to place the RHR system in the cross-tied configuration, certain motor-operated valves are needed to function even if the normal safety-related emergency AC electrical power source fails. The RHR Heat Exchanger Cross-Tie Modification, as described in Enclosure 9c to Attachment 9 of Reference 1, has been changed to ensure that these valves are provided with the capability of receiving power from either their normal source or from an alternate safety-related power supply. This will ensure that the failure of one emergency electrical AC source will not result in the loss of the RHR containment cooling function. Specifically, control switches in the Control Room will allow the operator to manually transfer power from a normal source to an alternate safety related source for the following valves, if necessary, in order to establish cross-tied RHR operation:

	Unit 2	Unit 3
RHR Cross-Tie Valves	MO-2-10-23452A,B	MO-3-10-33452A,B
RHR Flow Control Valves	CV-2-10-2677A,B,C,D	CV-3-10-3677A,B,C,D
RHR Heat Exchanger HPSW Outlet Valves	MO-2-10-089A,B,C,D	MO-3-10-089A,B,C,D

This will be accomplished by powering each of these valves through a motor control center (MCC) compartment with a transfer switch that can provide a redundant source of power within the same division. This modification will allow the operator to select the power supply and transfer power manually with control switches in the Control Room as required. There will be two new MCC compartments per division or a total of four for each unit.

In order to ensure that the fire safe shutdown requirements of Appendix R are met, control and transfer/isolation switches will be installed outside the Control Room that will allow the operator to prevent spurious operation of the 'B' RHR cross-tie valves (MO-2-10-23452B for Unit 2 and MO-3-10-33452B for Unit 3) and inadvertent switching of power sources in the event of a fire in the Control Room requiring shutdown from the alternative shutdown panel (ASD) panel. This will ensure that flow is not diverted from the protected 2B (Unit 2 'B' RHR pump and 'B' RHR heat exchanger) and 3D (Unit 3 'D' RHR pump and 'D' RHR heat exchanger) RHR trains.

All new RHR cross-tie components will meet PBAPS safety-related and seismic requirements applicable to the RHR system. The physical separation criteria as described in Chapter 8 of the UFSAR will be applied to the changes to the RHR Modification.

In accordance with the proposed surveillance requirements, the valves powered by the new MCC compartments will be tested while powered from their normal power supply during quarterly RHR surveillance testing. The capability to transfer from the normal to the alternate supply will also be tested on a frequency established in accordance with the Surveillance Frequency Control Program.

2.2 Proposed Changes to RHR and HPSW Technical Specifications

This supplement to the EPU LAR proposes three TS Surveillance Requirements (SR) associated with the changes to the RHR Modification which provide the Control Room operator with the capability to transfer the power supply to the motor-operated RHR cross-tie, RHR flow control and RHR heat exchanger HPSW outlet valves from the safety-related normal source to a safety-related alternate source.

2.2.1 RHR Suppression Pool Cooling TS

Control switches in the Control Room will provide the operator with the capability to transfer power for the motor-operated RHR cross-tie and RHR flow control valves from the normal source to the alternate source. The following new SR is proposed to be conducted in accordance with the Surveillance Frequency Control Program:

"SR 3.6.2.3.3
Verify manual transfer capability of power supply for the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve from the normal to the alternate source."

The ability to provide power to each motor-operated RHR flow control valve and RHR cross-tie valve from either of two independent 4kV emergency buses ensures that a single failure of an emergency AC electrical source will not result in failure of these valves.

2.2.2 RHR Suppression Pool Spray TS

The capability to transfer power for the motor-operated RHR cross-tie and RHR flow control valves described in Section 2.1.1 above for the Suppression Pool Cooling mode of RHR is also relied upon in the Suppression Pool Spray mode of RHR. The following new SR is proposed to be conducted in accordance with the Surveillance Frequency Control Program:

"SR 3.6.2.4.3
Verify manual transfer capability of power supply for the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve from the normal to the alternate source."

The ability to provide power to each motor-operated RHR flow control valve and RHR cross-tie valve from either of two independent 4kV emergency buses ensures that a single failure of an emergency AC electrical source will not result in failure of these valves.

2.2.3 HPSW System TS

The proposed TS changes in the EPU LAR (Attachment 2 to Reference 1) include a proposed SR for the transfer capability of the motor-operated HPSW cross-tie valves. This supplement proposes to revise that proposed SR to also include the motor-operated RHR heat exchanger HPSW outlet valves. The following SR is proposed to be conducted in accordance with the Surveillance Frequency Control Program:

"SR 3.7.1.2
Verify manual transfer capability of power supply for the HPSW cross-tie motor operated valve and the RHR heat exchanger HPSW outlet motor operated valve from the normal to the alternate source."

The ability to provide power to the motor-operated HPSW cross-tie valve and each motor-operated RHR heat exchanger HPSW outlet valve from either of two independent 4kV emergency buses ensures that a single failure of an emergency AC electrical source will not result in failure of a required HPSW system flow path.

2.3 Revision to Enclosure 9c, RHR Cross-Tie Heat Exchanger Modification

Certain sections of Enclosure 9c of Attachment 9 to the EPU LAR, which provided a description of the RHR Modification, are being revised to reflect the capability to provide both a normal and an alternate power source for each motor-operated RHR cross-tie, RHR flow control, and RHR heat exchanger HPSW outlet valve. An update of the affected text of Enclosure 9c is presented below. Additions are indicated by **bolded** characters and deletions are indicated with ~~strikethrough~~ markers. Gray highlighted sections are changes included in Supplement 1 (Reference 2).

The revision includes an update to Figure 9c-1, RESIDUAL HEAT REMOVAL SYSTEM CURRENT CONFIGURATION WITH RHR MODIFICATION CHANGES, which shows the configuration changes being made to the RHR system as a result of EPU including those discussed in this supplement. It is provided in Enclosure 1a to this Attachment. The revision to Enclosure 9c also includes a new Figure 9c-2, RHR AND HPSW MODIFICATIONS SINGLE LINE ELECTRICAL DIAGRAM that is also provided in Enclosure 1a. Figure 9c-2 updates the sketch provided in the response to EEEB RAI-11 (Reference 5) by showing the alternate power supply capability that will be provided to the motor-operated RHR cross-tie, RHR flow control and RHR heat exchanger HPSW outlet valves.

Enclosure 9c, Section 4.1.2 Electrical, page 8

In order to ensure that the capability to provide an RHR subsystem with two heat exchangers cross-tied to one RHR pump is maintained following a design basis accident with a loss of offsite power and the single failure of one emergency AC electrical power source, the motor-operators on the RHR cross-tie, RHR flow control and RHR heat exchanger HPSW outlet valves are capable of being powered from a safety-related normal and safety-related alternate electrical bus, within the same electrical division, backed by separate Emergency Diesel Generators.

~~The modification includes the following new safety related loads:~~

- ~~One new RHR cross-tie MOV per division.~~
- ~~A new motor-operated flow control valve on the discharge of each RHR pump.~~
- ~~Control room controls and indications~~.

The installation of new MCC compartments with remote manual transfer switches will provide the diverse power sources. Remote manual control switches will be installed in the Control Room to allow the operator to transfer power from the normal to the alternate power supply. Electrical separation of power, instrumentation and control cables associated with the RHR heat exchanger cross-tie modification ~~shall~~ **will** conform to physical separation criteria as described in Chapter 8 of the UFSAR.

~~Since the~~ **The** RHR heat exchanger cross-tie MOVs and the new flow instrumentation are not credited to achieve and maintain safe shutdown during an Appendix R fire for EPU **but the valves must remain closed for postulated fires in areas that they are credited for in their associated loop so flow is not diverted.**~~, p~~**P**rotection of ~~the~~ **these** cross-tie MOVs and associated cables from fire damage for the purpose of maintaining remote ~~or~~ manual ~~control~~ capability ~~for safe shutdown is not required~~ **to maintain the valve in a closed position will, therefore, be provided.** ~~However, the~~ **The** four new RHR flow control valve cables and power supplies will ~~require protection~~ **also be** protected from fire damage so that they can be controlled from the Control Room to support LPCI injection for Shutdown Method C (see PUSAR 2.5.1.4.2 for a description of the four Appendix R Shutdown Methods) and to support alternate shutdown cooling and suppression pool cooling as required for Shutdown Methods A, B, C, and D.

The RHR pumps are each powered from separate 4 KV emergency auxiliary buses and EDGs. The ~~cross-tie MOVs~~ **motor-operated RHR cross-tie, RHR flow control and RHR heat exchanger HPSW outlet valves in each RHR loop** will be **capable of being** powered from **normal and alternate** safety-related power sources through separate 4KV buses ~~from an~~ **backed by** EDG**s in the same division** such that the failure of one ~~EDG~~ **emergency AC electrical power source** will not result in the loss of **the RHR containment cooling** function ~~of the cross-tie in both loops. The new control MOV's will be powered from the same EDG as the associated RHR pump. The~~ **These** ~~new RHR cross-tie~~ MOVs are not ~~considered~~ **included** in the EDG loading calculations ~~since the~~ **because their** stroke time**s** ~~is~~ **are** 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 **RHR Heat Exchanger** ~~c~~**C**ross-tie, for operation of the RHR heat exchanger cross-tie MOVs.

Figure 9c-2 is a schematic that shows the electrical one-line arrangement of the power sources for the motor-operated RHR cross-tie, RHR flow control and RHR heat exchanger HPSW outlet valves as well as for the motor-operated HPSW cross-tie valves described in Enclosure 9d.

Enclosure 9c, Section 4.1.3, Instrumentation, page 9

<u>RHR Cross-Tie Isolation MOV</u>

This valve is normally closed, and will need to be ~~manually~~ opened to enter the RHR heat exchanger cross-tie mode of operation. Control room operators will be provided with manual controls for the RHR heat exchanger cross-tie isolation MOV with full open and full closed indicating lights. When the valve is in mid-travel, both the red and green lights will be illuminated. **New hand switches and indicating lights are being provided in the Control Room for manually controlling the transfer of power to the MOV from the Normal to Alternate source or vice versa. The indicating lights indicate if power is available on the Normal and Alternate sources.** All controls associated with the RHR heat exchanger cross-tie isolation MOV are classified as safety-related.

RHR Heat Exchanger Flow Control Valves

Manual controls are provided for the RHR flow control valves located downstream of the RHR pumps allowing the operator to throttle the valve position. Full travel indicating red and green lights are provided for the full open and full closed positions. These valves will be verified in the proper alignment for LPCI operation during RHR system surveillance testing (See Section 5.0, Operating with the RHR heat exchanger cross-tie). LPCI position lights are also provided in the Control Room to indicate to the operator that the throttling **RHR flow** control valves are in the proper alignment for LPCI operation. One white light will correspond to the valve position at the minimum LPCI flow rate, and the second white light will correspond to the valve position at the maximum allowable flow precluding RHR pump runout. An annunciator alarm is provided in the control room that will alarm when the valve position has moved outside of its allowable range of travel. **New hand switches and indicating lights are being provided in the Control Room for manually controlling the transfer of power to the MOV from the Normal to Alternate source or vice versa. The indicating lights indicate if power is available on the Normal and Alternate sources.** All components in the control circuit shall be classified as Active Safety-Related components.

Enclosure 9c, Section 5.0 OPERATING WITH RHR HEAT EXCHANGER CROSS-TIE/Surveillance Testing and Inservice Inspection, pages 11-12

Periodic surveillance testing will also include performance verification of the RHR heat exchanger cross-tie, ~~and~~ **RHR** flow control **and RHR heat exchanger HPSW outlet** valves in accordance with the MOV program and flow loop instrumentation calibration. A functional test of the normally closed **RHR** cross-tie ~~MOVs~~, ~~and~~ **RHR** flow control ,~~valves~~ **and RHR heat exchanger HPSW outlet valves** will be performed by stroking the valves during the test. **Periodic verification of the manual transfer capability of the power supply for these valves from the normal to alternate source will be conducted in accordance with the proposed surveillance requirements.**

Enclosure 9c, Section 6.2, SINGLE FAILURE ANALYSIS Without a Failure of One Emergency AC Electrical Power Source

g. MCC Compartment with Transfer Switch fails at Normal power selected

With the transfer switch failed in the normal power position, the MOVs for the associated motor-operated RHR cross-tie, RHR flow control and RHR heat exchanger HPSW outlet valves are still available to satisfy the containment cooling analysis requirements; therefore, there is no impact to the system.

h. MCC Compartment with Transfer Switch failure resulting in a loss of normal source and inability to transfer

With no power available to the MCC Compartment with Transfer Switch, the MOVs for the associated RHR cross-tie, RHR flow control and RHR heat exchanger HPSW outlet valves will fail in the normal position. The other complete RHR division is available with its two HPSW pumps providing flow through its two RHR heat exchangers, thus satisfying the containment cooling analysis requirements.

i **MCC Compartment with Transfer Switch fails at Alternate power selected**

With the transfer switch failed in the Alternate power position, the associated motor-operated RHR cross-tie, RHR flow control, and RHR heat exchanger HPSW outlet valves are still available to satisfy the containment cooling analysis requirements; therefore, there is no impact to the system.

2.4 Risk Assessment of Changes to RHR Heat Exchanger Cross-Tie Modification

The original assessment of the evaluation of the change in risk associated with the EPU was submitted as Attachment 12 to Reference 1. On the basis of this assessment, EGC concluded in PUSAR Section 2.13, Risk Evaluation (Attachment 4 and 6 of Reference 1) that it had adequately modeled or addressed the potential impacts associated with implementation of the EPU and that the associated risks are acceptable and do not create the "special circumstances" described in Appendix D of SRP Chapter 19. An additional evaluation has now been performed that reconfirms that the impacts on plant risk of the EPU are still acceptable with the changes to the RHR Modification that allow the Control Room operator to transfer power for the RHR cross-tie, RHR flow control and RHR heat exchanger HPSW outlet MOVs from a safety-related normal to a safety-related alternate 4kV bus, within the same electrical division, backed by separate Emergency Diesel Generators.

The evaluation, which did not take credit for the benefit of having back-up power supplies for these valves, included a bounding sensitivity case to determine the potential risk impact of changes to operator actions requiring the use of these valves that are necessitated by the RHR Modification. It concluded that there would be negligible potential increases to Core Damage Frequency (CDF) and Large Early Release Frequency (LERF). External events and low power shutdown risk were also assessed to be negligibly impacted. Therefore, the implementation of the proposed additional hardware changes would have no impact on the conclusions regarding overall plant risk in the EPU LAR.

2.5 Description of Changes to Inhibit HPCI /RCIC Pump Inadvertent Pump Suction Swap

Although the pre-EPU Appendix R scenarios assumed transfer of the suction of the HPCI and RCIC pumps from the CST to the suppression pool on low level, the post-EPU Appendix R scenarios rely on the greater decay heat removal capability of the cooler

CST and RWST source over the duration of the event. Enclosure 9e to Attachment 9 of the EPU LAR describes modifications that support CAP credit elimination by ensuring that the CST is the only suction source for the HPCI and RCIC systems during certain transients including Appendix R events. As stated in Enclosure 9e, the post-EPU configuration is evaluated as part of the normal implementation process to identify any potential circuits or equipment that are required for safe shutdown that could be affected by a design basis fire. This evaluation identified the need to manually inhibit Unit 2 RCIC, and Unit 3 HPCI and RCIC pump automatic suction swap from the CST to the suppression pool, as applicable, for a fire in certain fire areas. This will be accomplished by installing key-lock switches in the Control Room that will allow the operator to manually inhibit spurious suction swap that might occur as a result of fire damage. Annunciator windows will be provided in the Control Room to alert the operators when any of the key-lock switches are switched to an off-normal condition. This modification will be developed through the EGC Configuration Change Process. These changes involve new operator actions that are discussed in Section 3.0 below and Attachment 4 to this supplement.

3.0 HUMAN PERFORMANCE REVIEWS

This section addresses the human factors reviews related to the changes described in this supplement that are incorporated into the revision to PUSAR Section 2.11, Human Performance, which is included as Attachment 4 to this supplement. It provides updates to RAI's received in Reference 4 and responded to in Reference 5 that reflect the changes to the RHR Modification and key-lock switch for inhibiting HPCI and RCIC pump automatic suction swapover.

3.1 Revision to PUSAR Section 2.11, Human Performance

During the course of the detailed design process for implementation of the EPU, EGC has identified the need to make the following additional design changes in support of EPU and CAP credit elimination:

- New MCC compartments with remote manual transfer switches and associated control switches in the Control Room will be installed that will allow the operator to transfer power from a safety-related normal source to an alternate safety related source for the motor-operated RHR heat exchanger cross-tie, RHR flow control and RHR heat exchanger HPSW outlet valves.

- Control switches will be installed on the ASD panels for the 'B' motor-operated RHR cross-tie valves with each having a transfer/isolation switch in an emergency bus room panel to isolate the ASD panel control circuits from potentially fire damaged portions of the circuits that are routed to the Control Room.

- Transfer/isolation switches will be installed on the ASD panels to isolate the control circuits for the 2B and 3D MCC Compartments remote (i.e., Control Room) transfer switches and align these MCCs to their normal power supplies during Appendix R events where evacuation of the Control Room is required.

- Key-lock control switches will be installed to allow the operators to manually inhibit Unit 2 RCIC, and Unit 3 HPCI and RCIC pump automatic suction swap from the condensate storage tank to the suppression pool, as applicable, for a fire in certain fire areas. (see Enclosure 9e to Attachment 9 of Reference 1 for detailed discussion of the modification to raise the swapover setpoint in support of EPU and CAP credit elimination).

The revision to PUSAR Section 2.11 in Attachment 4 to this supplement also includes the following other changes:

- In Section 2.11.2.2, the time by which an operator must initiate Alternate Shutdown Cooling (ASDC) for Appendix R Method "A" with a Stuck Open Relief Valve (SORV) is changed to the current pre-EPU time of 180 minutes. It was determined that no change to the current operator response time is required to support the EPU Appendix R analysis. Prior to ASDC initiation, RCIC is utilized for Reactor Pressure Vessel (RPV) makeup. Therefore, the time limit of 180 minutes for ASDC initiation for RPV makeup is unchanged for EPU.

- Section 2.11.1.4 is revised to add the statement that the Safety Parameter Display System (SPDS) indications will be changed to reflect the fact that the percentage of Standby Liquid Control (SLC) tank volume required to achieve Hot Shutdown Boron Weight (HSBW) will change due to the increase in Boron-10 enrichment.

- Section 2.11.1.1 contains minor updates to the modifications associated with procedure changes.

The regulatory acceptance criteria for the human factors reviews are based on GDC-19, 10 CFR 50.120, 10 CFR 55, and the guidance in Generic Letter 82-33. The human factors reviews of the changes to operator actions, human-system interfaces, procedures and training resulting from the EPU LAR including the changes described in this supplement have no adverse affect on the existing programs, procedures, training, and other plant design features related to operator performance during normal and accident conditions.

3.2 Update to Health Physics and Human Performance (AHPB) Branch RAI's

In Reference 5, EGC provided responses to RAI's on the PBAPS EPU LAR received from the NRC in Reference 4. EGC's responses to three of the AHPB RAI's stated that additional information would be provided in a supplement to the EPU LAR. This information is provided herein as follows:

AHPB RAI-1

This RAI asked EGC if there were any new operator actions as a result of the proposed EPU other than those identified in PUSAR Section 2.11.1.2. EGC's response referred to PUSAR Section 2.11.1 for a general description of new operator actions and to Enclosures 9c and 9d (HPSW Cross-Tie Modification) for details of those operator actions specific to the RHR and HPSW systems. It also stated that a supplement would identify any additional operator actions. Those additional operator actions including those related to the modifications described above consist of the following:

- Operating procedures will be required to manually control the transfer of power from the Normal to Alternate source or vice versa for each of the four new MCC Compartments per unit associated with powering the motor-operated RHR flow control valves, RHR heat exchanger cross-tie valves, and the RHR heat exchanger HPSW outlet valves.

- Operating procedures will be revised to direct the operators to perform new actions to operate key-lock switches in the CR to inhibit Unit 2 RCIC, and Unit 3 HPCI and RCIC pump automatic suction swap, as applicable, for a fire in certain fire areas.

- New operator actions are required for Safe Shutdown Method "D" to address use of new transfer/isolation switches installed on the ASD panels to isolate the control circuits for the 2B and 3D MCC Compartments remote (i.e., Control Room) transfer switches and align these MCCs to their normal power supplies for a fire in the Control Room.

- New operator actions are required for Safe Shutdown Method "D" to address use of new control switches on the ASD panels for the "B" motor-operated RHR heat exchanger cross-tie valves, and their associated transfer/isolation switches in emergency bus room panels, to isolate the ASD panel control circuits from control circuits in the Control Room for a fire in the Control Room.

- New operator actions are required for Safe Shutdown Method "D" to direct the operators to ensure the new RHR flow control valves (MO-2-10-2677B & MO-3-10-3677D) are fully open by manually opening these valves at their respective MCC Compartment breaker by manipulating the motor contactor and then opening the breakers to preclude spurious mispositioning for a fire in the Control Room.

The above additional operator actions are incorporated into the revision of PUSAR Sections 2.11.1.2 and 2.11.1.3 provided in Attachment 4 to this supplement.

AHPB RAI-2

The RAI requested EGC to delineate which of the changes in PUSAR Section 2.11.1.2 are related to emergency or abnormal operating procedures. EGC's response in Reference 5 referred to PUSAR 2.11.1.1 for the identification of changes to EOP's and AOP's as a result of EPU. The response provided a table indicating which of the changes to operator actions identified in PUSAR Sections 2.11.1.2 and 2.11.1.3, are related to EOP's or AOP's. The response also indicated that a future supplement would be provided which would include additional operator actions that are related to EOP's and AOP's. The attached Table 1-1 provides this information as an update to the table provided in the response to this RAI. It includes the additional operator actions resulting from the modifications discussed above.

AHPB RAI-3

The RAI asked EGC if there are any operator actions as a result of EPU that will have additional or reduced response time other than those identified in PUSAR Section 2.11.1.2. EGC's response in Reference 5 referred to PUSAR Section 2.11.1.2 for a description of all operator actions involving additional or reduced response times. It also stated that a supplement to the EPU LAR would describe changes to the RHR Heat Exchanger Modification and provide any resulting changes to operator response times. It has been confirmed that neither the changes to the RHR Modification described in this supplement nor the new key-lock control switch to prevent automatic swapover of the RCIC and HPCI pump suctions will change the operator response times previously identified in the EPU LAR submittal (Reference 1). In the case of the new operator actions directly related to these changes and described in the update of the response to AHPB RAI-1 above, no time challenges were identified that would prevent completion of these actions in the required time. This information is incorporated into the attached revision of PUSAR Sections 2.11.1.2 and 2.11.1.3.

4.0 OSCILLATION POWER RANGE MONITOR (OPRM) TS CHANGE

4.1 Proposed Changes to RPS Instrumentation Technical Specification 3.3.1.1

The EPU LAR (Reference 1) proposed two changes to Technical Specification 3.3.1.1 related to the OPRM that would revise the power level by which the OPRM Upscale function is required to be OPERABLE from 25% Rated Thermal Power (RTP) to 21.2% RTP. EGC now requests that the power level for this requirement be established at 23% RTP rather than 21.2% RTP. This change will align the operability requirement of the OPRM Upscale function with the requirement for calibration of Average Power Range Monitors (APRM) per SR 3.3.1.1.2. Specifically:

- Table 3.3.1.1-1, Function 2.f, OPRM Upscale – This table item established the applicable power level at which the OPRM Upscale function is required to be OPERABLE. For EPU, it is now proposed that the stated value be changed from ≥25% to ≥23% RTP.

- REQUIRED ACTION J.1 – As directed by the requirements of Table 3.3.1.1-1, Function 2.f, Technical Specification Condition D invokes Required Action D.1 for the OPRM Upscale function. Should operability of the function not be restored in accordance with Required Action I, Required Action J would then require the operator to reduce power to a level at which the OPRM Upscale function is not applicable. This power level is established by the applicability requirement for Item 2.f of TS Table 3.3.1.1-1. For EPU, it is now proposed this be changed from <25% RTP to <23% RTP.

SR 3.3.1.1.2 requires calibration of the APRM simulated thermal power (STP) output to Core Thermal Power (CTP) calculated using the plant heat balance. The APRM STP output signal is used to enable OPRM protection at the OPRM trip auto-enable setpoint. Alignment of these requirements will ensure that the APRM STP signal is valid over the entire power range between the OPRM Upscale function operability threshold and the OPRM trip auto-enable setpoint. The SR 3.3.1.1.19 requirement establishing the OPRM trip auto-enable setpoint, currently proposed in Attachment 2 to Reference 1 at a power level of 26.2% RTP, is not affected by this request.

4.2 Technical Evaluation for Proposed Changes to TS 3.3.1.1

Background

The proposed changes to Technical Specification 3.3.1.1 in the EPU LAR (Reference 1) included two items related to the operable threshold of the OPRM Upscale function. EGC requests that the EPU amendment approval include a revised value for the OPRM Upscale function operability threshold change in two places in the Technical Specifications. This change is based on the implementation of a plant-specific analysis rather than the generic evaluation criteria used to establish the value in Reference 1. This proposed change will also maintain consistency between the power levels at which the OPRM Upscale function operability is required, the power levels at which the APRM gain calibration surveillance (SR 3.3.1.1.2) is performed, and the power levels at which the fuel thermal margin monitoring is initiated (SR 3.2.1.1, SR 3.2.2.1, and SR 3.2.3.1).

In the current PBAPS TS, the required power level for operability of the OPRM Upscale function is consistent with the power level at which the APRM gain calibration is performed (see TS SR 3.3.1.1.2.) This is also the power level at which fuel thermal margin monitoring is initiated (see TS Surveillance Requirements 3.2.1.1, 3.2.2.1, and 3.2.3.1). The EPU LAR (Reference 1) proposed the APRM gain calibration surveillance be performed at the power level consistent with the proposed fuel thermal margin monitoring threshold change. That threshold is established as described in Section 2.8.2.1.2 of Attachments 4 and 6 of the EPU LAR. For PBAPS, it is established at ≥23% RTP.

The value for establishing OPRM Upscale function operability was being revised in Reference 1 to a value that would provide margin to the proposed OPRM trip auto-enable setpoint of 26.2% RTP. The magnitude of this margin, proposed in Reference 1 as 5%, was intended to provide protection for an event that may occur below the auto-enable setpoint and result in power increasing above that setpoint without operator intervention. The margin to the OPRM Upscale function operability threshold in Reference 1 was determined to be consistent with generic evaluations described in Reference 3. That topical report established nominal thresholds for the operability of the

OPRM Upscale function and the trip auto-enable setpoint but it also states that the value for a plant can be established based on plant-specific analysis and setpoint considerations.

In support of this change, EGC has performed a plant-specific evaluation as described below.

Justification

Currently, the OPRM trip enabled region boundary is automatically enabled when RTP is ≥29.5% which is 4.5% above the 25% RTP OPRM Upscale operable threshold for the system. During the evaluation of the power uprate documented in the Power Uprate Safety Analysis Report (Attachments 4 and 6 of Reference 1), the generic evaluation criteria found in Reference 3 had been used. That approach resulted in the 5% difference between these parameters proposed in the EPU LAR. In order to demonstrate the acceptability of reducing the current 4.5% margin between the OPRM trip-enabled region boundary and the Upscale function operable threshold to the revised margin of 3.2%, EGC performed a plant-specific evaluation to identify the expected impact of credible transients that could occur at low power and result in uncontrolled power increases without operator action. Based on a plant-specific review of transients, it was concluded that the loss of feedwater heating transient (LFWH) is the only significant event that could potentially raise the reactor power into the region of anticipated oscillations without operator action.

An analysis was then undertaken to determine the power level increase that would be expected due to such an event. Considering normal feedwater temperatures and operation at power levels up to 23% RTP, it was determined that a LFWH event could result in a feedwater temperature reduction of up to 43°F. This lower feedwater temperature could result in a power increase in the core with a magnitude of about 1.5% power. Even this resulting increase (to 24.5% RTP) remains below the point at which the OPRM trip is required to be enabled (26.2% RTP). Thus, the resulting power transient would not be into a region where significant power oscillations would be expected before the automatic trip functions of the OPRM were enabled.

Bounding sensitivity cases were also evaluated considering higher initial feedwater temperatures and greater decreases in feedwater temperatures. These bounding cases are not representative of expected typical startup conditions, but the results of these cases provide additional confidence in the conclusion of the acceptability of this change. The use of higher initial feedwater temperatures and larger assumed (although not considered credible) feedwater temperature reductions results in larger core inlet subcooling and a larger positive reactivity insertion. Even with feedwater at its maximum temperature and a temperature drop of 58°F due to the loss of heating, the resulting power excursion is still less than 3.2%.

In summary, based on the results of a plant-specific evaluation, an OPRM Upscale function operable threshold value of ≥23% RTP provides adequate margin and assures that no credible event could result in an uncontrolled power excursion into a region where significant power oscillations could occur.

5.0 MISCELLANEOUS CHANGES AND CORRECTIONS TO THE EPU LAR

Additional corrections and clarifications that are unrelated to the changes to the RHR Modification or the proposed TS changes discussed above were also identified following submittal of the EPU LAR (Reference 1) and Supplement 1 to the EPU LAR (Reference 2) and are being provided here to prevent unnecessary RAI's. A description of the correction or clarification and a conclusion of the impact of each are provided in this section. Where text in paragraphs is affected, additions are indicated with **bolded** characters and deletions are indicated with ~~strikethrough~~ markers. EGC performed a review that concluded these changes do not affect the analyses performed, the conclusions reached, or the justification utilized for the proposed EPU.

The corrections to the PBAPS EPU LAR Attachments 4 and 6, Power Uprate Safety Analysis Report (PUSAR), consist of the following:

5.1 Deletion of PUSAR Table 2.5-7, EPU TBCCW Impact

PUSAR Section 2.5.3.3 evaluates the Turbine Building Closed Loop Cooling Water (TBCCW) System. The Technical Evaluation and Conclusion sections provide information to support the conclusion that the proposed EPU is acceptable with respect to the TBCCW system. This text does not rely on information that had been provided in Table 2.5-7. This correction deletes PUSAR Table 2.5-7 on page vii and 2-234.

5.2 Correction of PUSAR Reference 103 for NUREG-0713

Section 3 of the PUSAR contains the References utilized in the document. Reference 103 cites NUREG-0713, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities – 2006." The technical evaluation performed to support PUSAR Section 2.10.1.2 used the data from NUREG-0713 – 2008. The correction changes the reference title to reflect the report volume used in the analysis as noted below.

103. NUREG-0713, Volume 30, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities **2008,"published January 2010.**~~.~~

5.3 Correction of Numerical Value in PUSAR Section 2.10.1.2

PBAPS Section 2.10.1.2 evaluates the Occupational and Onsite Radiation Exposures. In the third paragraph on Page 2-511, the text incorrectly states the average dose per exposed worker at PBAPS is 0.024% of the limit allowed by 10 CFR 20.1201. The text correctly cites the average dose value of 0.12 Rem from NUREG-0713, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and other Facilities 2008."

Since the annual limit is 5.0 Rem, the 0.12 Rem value is 2.4% of the annual limit. The correction replaces 0.024% with 2.4% as noted in the revised text below.

"Annual cumulative occupational radiation exposure may increase by as much as 20% due to EPU compared to OLTP conditions. Individual worker exposure will continue to be maintained within acceptable limits by the ALARA program, which controls access to radiation areas. The radiation exposure in all affected plant areas is not expected to increase greater than the proposed 20% EPU compared to OLTP conditions with the exception of areas that contain N-16 containing components as noted above. The post-EPU increase in the radiation exposure in various areas housing the steam components remains within the currently established dose zone limits as described above. Therefore, no additional measures are required to maintain the plant exposure ALARA. The post-EPU plant operation and maintenance activities will be controlled by the existing radiation protection and ALARA procedures. For example, for the year 2008, the average dose per exposed worker at PBAPS (Total Combined Units) was 0.12 Rem, which is **2.4%**~~0.024%~~ of the limit allowed by 10 CFR 20.1201. Annual cumulative occupational radiation exposure may increase by approximately 14% due to EPU, which is well within the historical variation in station annual cumulative exposure. Additionally, improvements in performance with respect to occupational doses, as documented in NUREG-0713 (Reference 103), exceed by an order of magnitude anticipated EPU effects."

6.0 REFERENCES

1. Exelon Generation to U.S. Nuclear Regulatory Commission dated September 28, 2012; License Amendment Request – Extended Power Uprate (ML122860201).

2. Exelon Generation to U.S. Nuclear Regulatory Commission dated February 15, 2013; Supplemental Information and Corrections Supporting License Amendment Request – Extended Power Uprate – Supplement No. 1 (ML13051A032).

3. GEH Licensing Topical Report "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC PRNM) Retrofit Plus Option III Stability Trip Function," NEDC-32410P-A Supplement 1, dated November 1997.

4. U.S. Nuclear Regulatory Commission to Exelon Generation dated April 26, 2013; Peach Bottom Atomic Power Station – Units 2 and 3 – Request for Additional Information for Extended Power Uprate (TAC Nos. ME9631 and ME9632).

5. Exelon Generation to U.S. Nuclear Regulatory Commission dated May 24, 2013; Supplement 3 Response to Request for Additional Information – Extended Power Uprate.

TABLE 1-1

NEW OR CHANGED OPERATOR ACTIONS THAT IMPACT EMERGENCY OR ABNORMAL PROCEDURES

(New or changed operator actions not included in the Reference 5 EGC response to AHPB RAI-2 are shaded)

	OPERATOR ACTION	PROCEDURE TYPE IMPACTED
	PUSAR Section 2.11.1.2.1 ACTIONS	
1.	A new operator action will be created to place the RHR heat exchanger cross-tie valve in service if required to mitigate a rise in suppression pool temperature during an accident or event.	EOP
2.	A new operator action will be created to start a second HPSW Pump and establish a flow path through the second RHR Heat Exchanger when the RHR heat exchanger cross-tie is placed in service, and place the HPSW cross-tie in service, if required.	EOP
3.	Operators will control the depressurization of the units to minimize the impact of a rise in suppression pool temperature associated with the interruption of containment cooling (SPC or sprays) that occurs upon receipt of a LOCA signal.	AOP
	PUSAR Section 2.11.1.2.2 ACTIONS	
4.	Operating procedures will require the operators to refill the CST from the RWST during Method "A", 'B' and 'D' shutdowns to provide inventory for the HPCI or RCIC system and maintain the suction of the HPCI and RCIC pumps on the CST rather than the suppression pool, and ensure NPSH margin without the need for CAP credit.	AOP
5.	Operating procedures will be revised to direct the operators to perform new actions to operate key-lock switches in the CR to inhibit Unit 2 RCIC, and Unit 3	AOP (Planned)

	OPERATOR ACTION	PROCEDURE TYPE IMPACTED
	HPCI and RCIC pump automatic suction swap, as applicable, for a fire in certain fire areas.	
6.	The time is reduced in which an operator is required to secure, from the CR, a HPCI pump that has spuriously started from 10 to 7.5 minutes during a Method "A" shutdown without a SORV.	AOP
7.	The time by which an operator must initiate ASDC during a Method "A" shutdown with a SORV is unchanged from the current Method "A" requirement of 180 minutes.	AOP
8.	The time for an operator to initiate ASDC during Method "C" shutdowns is increased from 30 minutes to 14 hours, while the time for initiation of RPV depressurization from the Control Room is decreased from 27.5 minutes to 26.5 minutes for case C1 and 15 to 14.7 minutes for case C2.	EOP
9.	The time for an operator to initiate ASDC during Method "D" shutdowns, without a SORV, is increased from 300 minutes to 364 minutes, while the time for initiation of RPV depressurization from the ASD panel is decreased from 5 to 3.5 hours.	AOP
10.	The time for an operator to initiate SPC from the Control Room during Method "D" shutdowns with a SORV is decreased from 4 to 2.5 hours, while without a SORV, the time for initiation of SPC is decreased from 180 minutes to 150 minutes.	AOP
11.	The time for an operator to initiate ASDC during Method "D" shutdowns, with a SORV, is increased from 240 to 270 minutes.	AOP
12.	New operator actions are required for Method "D" to address use of new transfer/isolation switches installed on the ASD panels to isolate the control circuits for the 2B and 3D MCC Compartments remote (Control Room) transfer switches and align these MCCs to their normal power supplies for a fire in the Control Room.	AOP

	OPERATOR ACTION	PROCEDURE TYPE IMPACTED
13.	New operator actions are required for Method "D" to address use of new control switches on the ASD Panels for the 'B' Loop RHR heat exchanger cross-tie MOV's, and their associated transfer/isolation switches in emergency bus room panels, to isolate the ASD panel control circuits from control circuits in the Control Room for a fire in the Control Room.	AOP
14.	New operator actions are required for Method "D" to direct the operators to ensure the new RHR flow control valves (MO-2-10-2677B & MO-3-10-3677D) are fully open by manually opening these valves at their respective MCC Compartment breaker by manipulating the motor contactor and then opening the breakers to preclude spurious mispositioning for a fire in the Control Room.	AOP
	PUSAR Section 2.11.1.3 ACTIONS	
15.	Balance flow through the RHR heat exchangers when operating with the RHR heat exchanger cross-tie open.	EOP
16.	Manually control the transfer of power for the HPSW cross-tie MOV from the Normal to Alternate source or vice versa.	AOP
17.	Manually control the transfer of power from the Normal to Alternate source or vice versa for each of the four new MCC Compartments per unit associated with powering the motor-operated RHR flow control valves, RHR heat exchanger cross-tie valves, and the RHR heat exchanger HPSW outlet valves.	AOP

Enclosure 1a to Attachment 1

Peach Bottom Atomic Power Station Units 2 and 3

Supplement No. 5 to Extended Power Uprate License Amendment Request

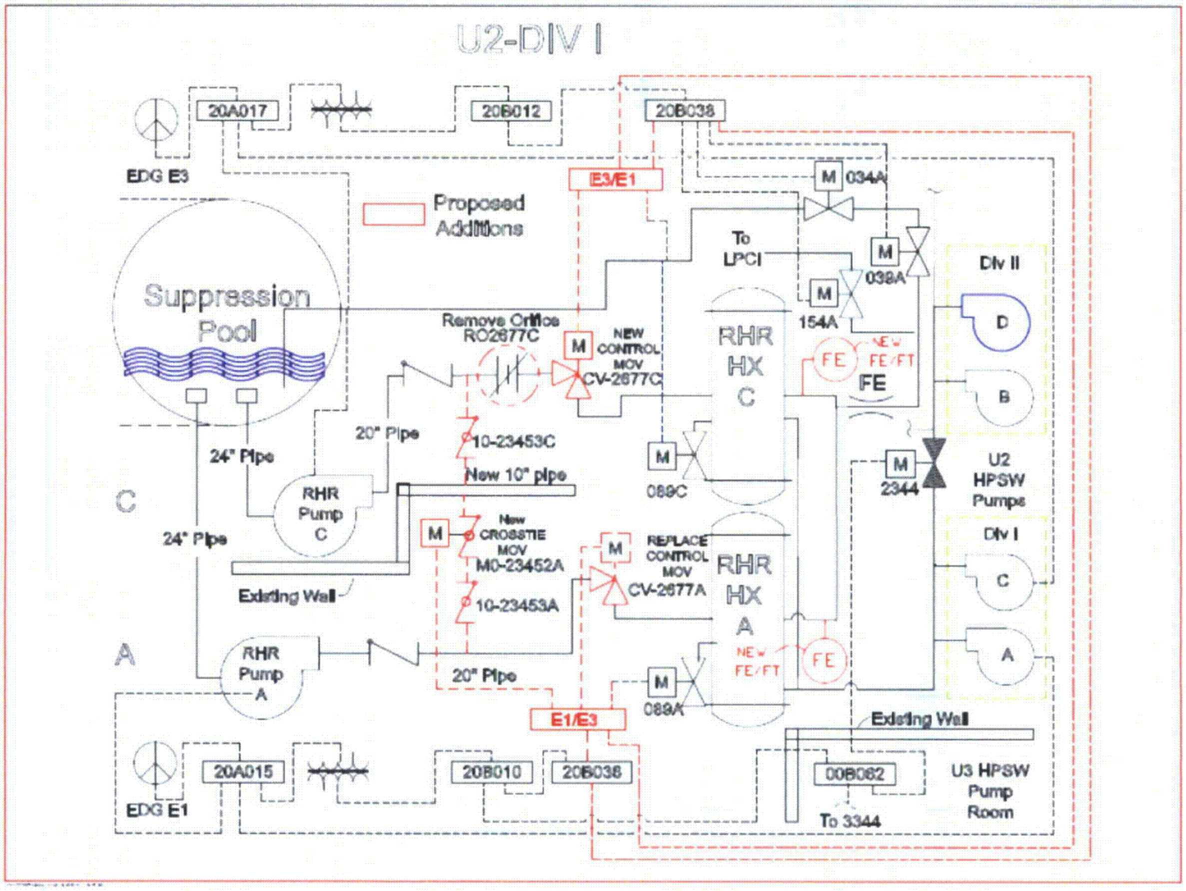
NRC Docket Nos. 50-277 and 50-278

Figure 9c-1, RESIDUAL HEAT REMOVAL SYSTEM CURRENT CONFIGURATION WITH RHR MODIFICATION CHANGES – FOR INFORMATION ONLY

Figure 9c-2 RHR AND HPSW MODIFICATIONS SINGLE LINE ELECTRICAL DIAGRAM – FOR INFORMATION ONLY

FIGURE 9c-1

RESIDUAL HEAT REMOVAL SYSTEM
CURRENT CONFIGURATION WITH RHR MODIFICATION CHANGES
FOR INFORMATION ONLY
NOT A CONTROLLED DRAWING

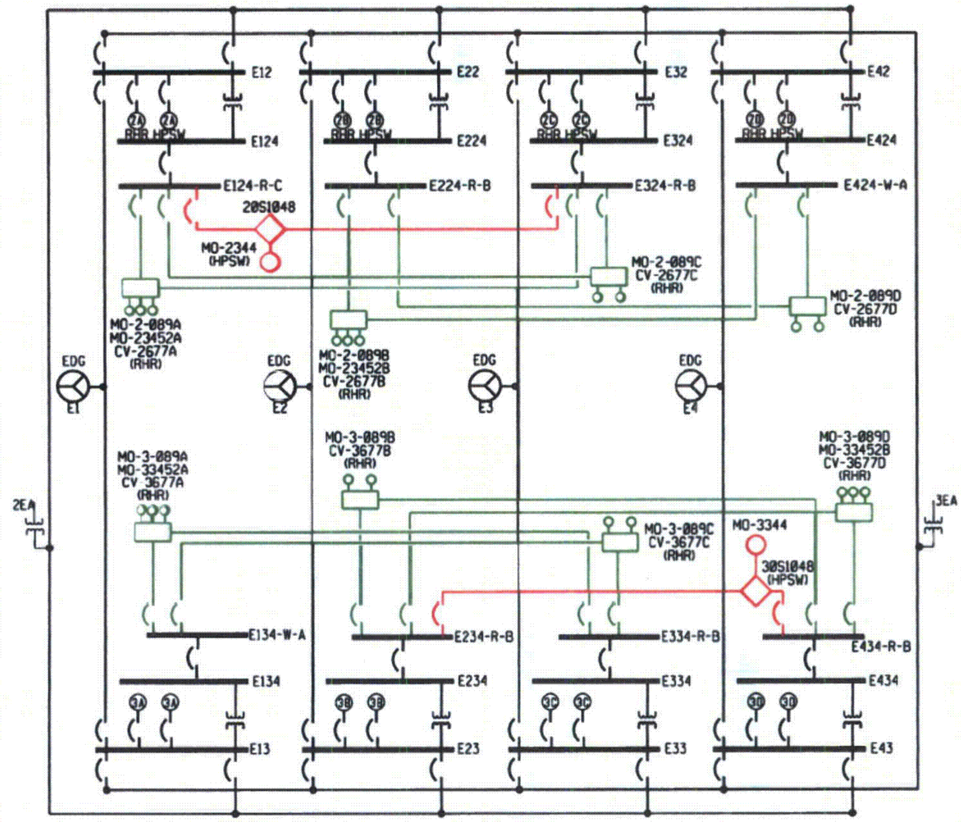


BLACK lines show plant configuration prior to EPU

RED lines show the addition of the RHR Heat Exchanger Cross-Tie Modification including the transfer switch modifications.

FIGURE 9c-2

RHR AND HPSW MODIFICATIONS SINGLE LINE ELECTRICAL DIAGRAM
FOR INFORMATION ONLY
NOT A CONTROLLED DRAWING



BLACK lines show plant configuration prior to the EPU modification.
RED lines show the addition of the HPSW Cross-Tie transfer switch modification for EPU.
GREEN lines show the addition of the RHR Heat Exchanger Cross-Tie transfer switch modification for EPU.

ATTACHMENT 2

Peach Bottom Atomic Power Station Units 2 and 3

Supplement No. 5 to Extended Power Uprate License Amendment Request

NRC Docket Nos. 50-277 and 50-278

Replacement Markups of Technical Specification Pages for Units 2 and 3

(Proposed revisions to the TS changes proposed in Attachment 2 of the EPU LAR dated September 28, 2012 are shaded)

3.3-3

3.3-7

3.6-28

3.6-30

3.7-2

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. As required by Required Action D.1 and referenced in Table 3.3.1.1-1.	H.1 Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies.	Immediately
I. As required by Required Action D.1 and referenced in Table 3.3.1.1-1.	I.1 Initiate alternate method to detect and suppress thermal hydraulic instability oscillations. <u>AND</u> I.2 --------NOTE-------- LCO 3.0.4 is not applicable. -------------------- Restore required channels to OPERABLE.	12 hours 120 days
J. Required Action and associated Completion Time of Condition I not met.	J.1 Reduce THERMAL POWER to ~~≤25%~~ 23% RTP.	4 hours

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

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

(continued)

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

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

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

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

Insert B

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.2.3.1	Verify each RHR suppression pool cooling subsystem manual, power operated, and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position is in the correct position or can be aligned to the correct position.	In accordance with the Surveillance Frequency Control Program.
SR 3.6.2.3.2	Verify each required RHR pump develops a flow rate ≥ ~~10,000~~ 8,600 gpm through the associated heat exchanger while operating in the suppression pool cooling mode.	In accordance with the Inservice Testing Program

SR 3.6.2.3.3	Verify manual transfer capability of power supply for the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve from the normal source to the alternate source.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.2.4.1	Verify each RHR suppression pool spray subsystem manual, power operated, and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position is in the correct position or can be aligned to the correct position.	In accordance with the Surveillance Frequency Control Program.
SR 3.6.2.4.2	Verify each suppression pool spray nozzle is unobstructed.	In accordance with the Surveillance Frequency Control Program.
SR 3.6.2.4.3	Verify manual transfer capability of power supply for the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve from the normal source to the alternate source.	In accordance with the Surveillance Frequency Control Program.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~D.~~ E. Required Action and associated Completion Time of Condition ~~C~~ D not met.	~~D.1~~ E.1 Be in MODE 3.	12 hours
	AND	
	~~D.2~~ E.2 Be in MODE 4.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.1.1	Verify each HPSW manual and power operated valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position or can be aligned to the correct position.	In accordance with the Surveillance Frequency Control Program.
SR 3.7.1.2	Verify manual transfer capability of power supply for the HPSW cross-tie motor-operated valve and the RHR heat exchanger HPSW outlet valve from the normal source to the alternate source.	In accordance with the Surveillance Frequency Control Program.

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
H. As required by Required Action D.1 and referenced in Table 3.3.1.1-1.	H.1	Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies.	Immediately
I. As required by Required Action D.1 and referenced in Table 3.3.1.1-1.	I.1	Initiate alternate method to detect and suppress thermal hydraulic instability oscillations.	12 hours
	<u>AND</u>		
	I.2	--------NOTE-------- LCO 3.0.4 is not applicable. -------------------- Restore required channels to OPERABLE.	120 days
J. Required Action and associated Completion Time of Condition I not met.	J.1	Reduce THERMAL POWER to < ~~25%~~ 23% RTP.	4 hours

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

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

(continued)

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

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

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

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

[Insert B]

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.2.3.1	Verify each RHR suppression pool cooling subsystem manual, power operated, and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position is in the correct position or can be aligned to the correct position.	In accordance with the Surveillance Frequency Control Program.
SR 3.6.2.3.2	Verify each required RHR pump develops a flow rate ≥ ~~10,000~~ 8,600 gpm through the associated heat exchanger while operating in the suppression pool cooling mode.	In accordance with the Inservice Testing Program
SR 3.6.2.3.3	Verify manual transfer capability of power supply for the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve from the normal source to the alternate source.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.2.4.1	Verify each RHR suppression pool spray subsystem manual, power operated, and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position is in the correct position or can be aligned to the correct position.	In accordance with the Surveillance Frequency Control Program.
SR 3.6.2.4.2	Verify each suppression pool spray nozzle is unobstructed.	In accordance with the Surveillance Frequency Control Program.
SR 3.6.2.4.3	Verify manual transfer capability of power supply for the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve from the normal source to the alternate source.	In accordance with the Surveillance Frequency Control Program.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~D.~~ E. Required Action and associated Completion Time of Condition ~~C~~ D not met.	~~D.1~~ E.1 Be in MODE 3.	12 hours
	AND	
	~~D.2~~ E.2 Be in MODE 4.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.1.1	Verify each HPSW manual and power operated valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position or can be aligned to the correct position.	In accordance with the Surveillance Frequency Control Program.
SR 3.7.1.2	Verify manual transfer capability of power supply for the HPSW cross-tie motor-operated valve and the RHR heat exchanger HPSW outlet valve from the normal source to the alternate source.	In accordance with the Surveillance Frequency Control Program.

ATTACHMENT 3

Peach Bottom Atomic Power Station Units 2 and 3

Supplement No. 4 to Extended Power Uprate License Amendment Request

NRC Docket Nos. 50-277 and 50-278

Replacement Markups of Technical Specification Bases Pages for Units 2 and 3

(Proposed revisions to the TS Bases changes proposed in Attachment 3 of the EPU LAR dated September 28, 2012 are shaded)

B 3.3-12a

B3.6-59

B3.6-63

B3.7-5

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

2.f. Oscillation Power Range Monitor (OPRM) Upscale

The OPRM Upscale Function provides compliance with 10 CFR 50, Appendix A, General Design Criteria (GDC) 10 and 12, thereby providing protection from exceeding the fuel MCPR safety limit (SL) due to anticipated thermal-hydraulic power oscillations.

References 14, 15 and 16 describe three algorithms for detecting thermal-hydraulic instability related neutron flux oscillations: the period based detection algorithm (PBDA), the amplitude based algorithm (ABA), and the growth rate algorithm (GRA). All three are implemented in the OPRM Upscale Function, but the safety analysis takes credit only for the PBDA. The remaining algorithms provide defense in depth and additional protection against unanticipated oscillations. OPRM Upscale Function OPERABILITY for Technical Specifications purposes is based only on the PBDA.

The OPRM Upscale Function receives input signals from the local power range monitors (LPRMs) within the reactor core, which are combined into "cells" for evaluation by the OPRM algorithms. Each channel is capable of detecting thermal-hydraulic instabilities, by detecting the related neutron flux oscillations, and issuing a trip signal before the MCPR SL is exceeded. Three of the four channels are required to be OPERABLE.

The OPRM Upscale trip is automatically enabled (bypass removed) when THERMAL POWER is ≥ ~~29.5~~% RTP, as indicated by the APRM Simulated Thermal Power, and reactor core flow is < 60% of rated flow, as indicated by APRM measured recirculation drive flow. This is the operating region where actual thermal-hydraulic instability and related neutron flux oscillations may occur (Reference 18). These setpoints, which are sometimes referred to as the "auto-bypass" setpoints, establish the boundaries of the OPRM Upscale trip enabled region.

23 26.2

The OPRM Upscale Function is required to be OPERABLE when the plant is at ≥ ~~25~~% RTP. The ~~25~~% RTP level is selected to provide margin in the unlikely event that a reactor power increase transient occurring while the plant is operating below ~~29.5~~% RTP causes a power increase to or beyond the ~~29.5~~% APRM Simulated Thermal Power OPRM Upscale trip auto-enable setpoint without operator action. This OPERABILITY requirement assures that the OPRM Upscale trip auto-enable function will be OPERABLE when required.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.6.2.3.1

Verifying the correct alignment for manual, power operated, and automatic valves in the RHR suppression pool cooling mode flow path provides assurance that the proper flow path exists for system operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve is also allowed to be in the nonaccident position provided it can be aligned to the accident position within the time assumed in the accident analysis. This is acceptable since the RHR suppression pool cooling mode is manually initiated. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.6.2.3.2

8,600

Verifying that each required RHR pump develops a flow rate ≥ ~~10,000~~ gpm while operating in the suppression pool cooling mode with flow through the associated heat exchanger ensures that pump performance has not degraded during the cycle. Flow is a normal test of centrifugal pump performance required by ASME Code (Ref. 3). This test confirms one point on the pump design curve, and the results are indicative of overall performance. Such inservice inspections confirm component OPERABILITY, trend performance, and detect incipient failures by indicating abnormal performance. The Frequency of this SR is in accordance with the Inservice Testing Program.

Insert C - B 3.6.2.3

REFERENCES

1. UFSAR, Section 14.6.3.

2. NEDC-32988-A, Revision 2, Technical Justification to Support Risk-Informed Modification to Selected Required End States for BWR Plants, December 2002.

3. ASME Code for Operation and Maintenance of Nuclear Power Plants.

Insert C - B 3.6.2.3

SR 3.6.2.3.3

Verification of manual transfer between the normal and alternate power source (4kV emergency bus) for each RHR motor-operated flow control valve and each RHR cross-tie motor-operated valve demonstrates that AC power will be available to operate the required valves following loss of power to any single 4kV emergency bus. The ability to provide power to each RHR motor-operated flow control valve and each RHR cross-tie motor-operated valve from either of two independent 4kV emergency buses ensures that a single failure of a DG will not result in failure of the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve; therefore, failure of the manual transfer capability will result in inoperability of the associated RHR Suppression Pool Cooling subsystem. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.6.2.4.1

Verifying the correct alignment for manual, power operated, and automatic valves in the RHR suppression pool spray mode flow path provides assurance that the proper flow paths will exist for system operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve is also allowed to be in the nonaccident position provided it can be aligned to the accident position within the time assumed in the accident analysis. This is acceptable since the RHR suppression pool cooling mode is manually initiated. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.6.2.4.2

This Surveillance is performed to verify that the spray nozzles are not obstructed and that flow will be provided when required. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. UFSAR, Sections 5.2 and 14.6.3.
2. NEDC-32988-A, Revision 2, Technical Justification to Support Risk-Informed Modification to Selected Required End States for BWR Plants, December 2002.

SR 3.6.2.4.3

Verification of manual transfer between the normal and alternate power source (4kV emergency bus) for each RHR motor-operated flow control valve and each RHR cross-tie motor-operated valve demonstrates that AC power will be available to operate the required valves following loss of power to any single 4kV emergency bus. The ability to provide power to each RHR motor-operated flow control valve and each RHR cross-tie motor-operated valve from either of two independent 4kV emergency buses ensures that a single failure of a DG will not result in failure of the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve; therefore, failure of the manual transfer capability will result in inoperability of the associated RHR Suppression Pool Spray subsystem. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES (continued)

ACTIONS (continued)

E.1 and E.2

~~D.1 and D.2~~

If the HPSW subsystems cannot be restored to OPERABLE status within the associated Completion Time of Condition D ~~C~~, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours and in MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.1.1

Verifying the correct alignment for each manual and power operated valve in each HPSW subsystem flow path provides assurance that the proper flow paths will exist for HPSW operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves are verified to be in the correct position prior to locking, sealing, or securing. A valve is also allowed to be in the nonaccident position, and yet considered in the correct position, provided it can be realigned to its accident position. This is acceptable because the HPSW System is a manually initiated system.

This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

Add Bases 3.7.1 Insert F

REFERENCES

1. UFSAR, Section 10.7.

2. UFSAR, Chapter 14.

3. ~~NEDC-32183P, "Power Rerate Safety Analysis Report For Peach Bottom 2 & 3," May 1993.~~ NEDC-33566P, "Safety Analysis Report for Exelon Peach Bottom Atomic Power Station, Units 2 and 3, Constant Pressure Power Uprate," Revision 0.

4. UFSAR, Section 14.6.3.

5. NEDC-32988-A, Revision 2, Technical Justification to Support Risk-Informed Modification to Selected Required End States for BWR Plants, December 2002.

Bases 3.7.1 Insert F

SR 3.7.1.2

Verification of manual transfer between the normal and alternate power source (4kV emergency bus) for the HPSW cross-tie motor-operated valve and each RHR heat exchanger HPSW outlet valve demonstrates that AC power will be available to operate the valves following loss of power to any single 4kV emergency bus. The ability to provide power to the HPSW cross-tie valve and each RHR heat exchanger HPSW outlet valve from either of two independent 4kV emergency buses ensures that a single failure of a DG will not result in failure of a required HPSW system flow path; therefore, failure of the manual transfer capability will result in inoperability of the associated HPSW subsystem. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

2.f. Oscillation Power Range Monitor (OPRM) Upscale

The OPRM Upscale Function provides compliance with 10 CFR 50, Appendix A, General Design Criteria (GDC) 10 and 12, thereby providing protection from exceeding the fuel MCPR safety limit (SL) due to anticipated thermal-hydraulic power oscillations.

References 14, 15 and 16 describe three algorithms for detecting thermal-hydraulic instability related neutron flux oscillations: the period based detection algorithm (PBDA), the amplitude based algorithm (ABA), and the growth rate algorithm (GRA). All three are implemented in the OPRM Upscale Function, but the safety analysis takes credit only for the PBDA. The remaining algorithms provide defense in depth and additional protection against unanticipated oscillations. OPRM Upscale Function OPERABILITY for Technical Specifications purposes is based only on the PBDA.

The OPRM Upscale Function receives input signals from the local power range monitors (LPRMs) within the reactor core, which are combined into "cells" for evaluation by the OPRM algorithms. Each channel is capable of detecting thermal-hydraulic instabilities, by detecting the related neutron flux oscillations, and issuing a trip signal before the MCPR SL is exceeded. Three of the four channels are required to be OPERABLE.

The OPRM Upscale trip is automatically enabled (bypass removed) when THERMAL POWER is ≥ ~~29.5~~% RTP, as indicated by the APRM Simulated Thermal Power, and reactor core flow is < 60% of rated flow, as indicated by APRM measured recirculation drive flow. This is the operating region where actual thermal-hydraulic instability and related neutron flux oscillations may occur (Reference 18). These setpoints, which are sometimes referred to as the "auto-bypass" setpoints, establish the boundaries of the OPRM Upscale trip enabled region.

23

26.2

The OPRM Upscale Function is required to be OPERABLE when the plant is at ≥ ~~25~~% RTP. The ~~25~~% RTP level is selected to provide margin in the unlikely event that a reactor power increase transient occurring while the plant is operating below ~~29.5~~% RTP causes a power increase to or beyond the ~~29.5~~% APRM Simulated Thermal Power OPRM Upscale trip auto-enable setpoint without operator action. This OPERABILITY requirement assures that the OPRM Upscale trip auto-enable function will be OPERABLE when required.

26.2

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.6.2.3.1

Verifying the correct alignment for manual, power operated, and automatic valves in the RHR suppression pool cooling mode flow path provides assurance that the proper flow path exists for system operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve is also allowed to be in the nonaccident position provided it can be aligned to the accident position within the time assumed in the accident analysis. This is acceptable since the RHR suppression pool cooling mode is manually initiated. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.6.2.3.2

8,600

Verifying that each required RHR pump develops a flow rate ≥ ~~10,000~~ gpm while operating in the suppression pool cooling mode with flow through the associated heat exchanger ensures that pump performance has not degraded during the cycle. Flow is a normal test of centrifugal pump performance required by ASME Code (Ref. 3). This test confirms one point on the pump design curve, and the results are indicative of overall performance. Such inservice inspections confirm component OPERABILITY, trend performance, and detect incipient failures by indicating abnormal performance. The Frequency of this SR is in accordance with the Inservice Testing Program.

Insert C - B 3.6.2.3

REFERENCES

1. UFSAR, Section 14.6.3.
2. NEDC-32988-A, Revision 2, Technical Justification to Support Risk-Informed Modification to Selected Required End States for BWR Plants, December 2002.
3. ASME Code for Operation and Maintenance of Nuclear Power Plants.

Insert C - B 3.6.2.3

SR 3.6.2.3.3

Verification of manual transfer between the normal and alternate power source (4kV emergency bus) for each RHR motor-operated flow control valve and each RHR cross-tie motor-operated valve demonstrates that AC power will be available to operate the required valves following loss of power to any single 4kV emergency bus. The ability to provide power to each RHR motor-operated flow control valve and each RHR cross-tie motor-operated valve from either of two independent 4kV emergency buses ensures that a single failure of a DG will not result in failure of the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve; therefore, failure of the manual transfer capability will result in inoperability of the associated RHR Suppression Pool Cooling subsystem. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.6.2.4.1

Verifying the correct alignment for manual, power operated, and automatic valves in the RHR suppression pool spray mode flow path provides assurance that the proper flow paths will exist for system operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve is also allowed to be in the nonaccident position provided it can be aligned to the accident position within the time assumed in the accident analysis. This is acceptable since the RHR suppression pool cooling mode is manually initiated. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.6.2.4.2

This Surveillance is performed to verify that the spray nozzles are not obstructed and that flow will be provided when required. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.6.2.4.3

Verification of manual transfer between the normal and alternate power source (4kV emergency bus) for each RHR motor-operated flow control valve and each RHR cross-tie motor-operated valve demonstrates that AC power will be available to operate the required valves following loss of power to any single 4kV emergency bus. The ability to provide power to each RHR motor-operated flow control valve and each RHR cross-tie motor-operated valve from either of two independent 4kV emergency buses ensures that a single failure of a DG will not result in failure of the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve; therefore, failure of the manual transfer capability will result in inoperability of the associated RHR Suppression Pool Spray subsystem. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. UFSAR, Sections 5.2 and 14.6.3.

2. NEDC-32988-A, Revision 2, Technical Justification to Support Risk-Informed Modification to Selected Required End States for BWR Plants, December 2002.

BASES

E.1 and E.2

ACTIONS (continued)

~~D.1 and D.2~~

D

If the HPSW subsystems cannot be restored to OPERABLE status within the associated Completion Time of Condition ~~C~~, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours and in MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.1.1

Verifying the correct alignment for each manual and power operated valve in each HPSW subsystem flow path provides assurance that the proper flow paths will exist for HPSW operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves are verified to be in the correct position prior to locking, sealing, or securing. A valve is also allowed to be in the nonaccident position, and yet considered in the correct position, provided it can be realigned to its accident position. This is acceptable because the HPSW System is a manually initiated system.

This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

Add Bases 3.7.1 Insert F

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. UFSAR, Section 10.7.
2. UFSAR, Chapter 14.
3. ~~NEDC-32183P, "Power Rerate Safety Analysis Report For Peach Bottom 2 & 3," May 1993.~~ NEDC-33566P, "Safety Analysis Report for Exelon Peach Bottom Atomic Power Station, Units 2 and 3, Constant Pressure Power Uprate," Revision 0.
4. UFSAR, Section 14.6.3.
5. NEDC-32988-A, Revision 2, Technical Justification to Support Risk-Informed Modification to Selected Required End States for BWR Plants, December 2002.

Bases 3.7.1 Insert F

SR 3.7.1.2

Verification of manual transfer between the normal and alternate power source (4kV emergency bus) for the HPSW cross-tie motor-operated valve and each RHR heat exchanger HPSW outlet valve demonstrates that AC power will be available to operate the valves following loss of power to any single 4kV emergency bus. The ability to provide power to the HPSW cross-tie valve and each RHR heat exchanger HPSW outlet valve from either of two independent 4kV emergency buses ensures that a single failure of a DG will not result in failure of a required HPSW system flow path; therefore, failure of the manual transfer capability will result in inoperability of the associated HPSW subsystem. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

ATTACHMENT 4

Peach Bottom Atomic Power Station Units 2 and 3

Supplement No. 5 to Extended Power Uprate License Amendment Request

NRC Docket Nos. 50-277 and 50-278

Replacement Text for PUSAR 2.11, Human Performance in Attachments 4 and 6 of PBAPS EPU LAR Submitted September 28, 2012

2.11 Human Performance

2.11.1 Human Factors

Regulatory Evaluation

The area of human factors deals with programs, procedures, training, and plant design features related to operator performance during normal and accident conditions. The PBAPS human factors evaluation was conducted to ensure that operator performance is not adversely affected as a result of system changes made to implement the proposed EPU. The review covered changes to operator actions, human-system interfaces, and procedures and training needed for the proposed EPU. The regulatory acceptance criteria for human factors are based on GDC-19, 10 CFR 50.120, 10 CFR 55, and the guidance in GL 82-33 (Reference 111).

Peach Bottom Current Licensing Basis

The following sections of the PBAPS current licensing basis are related to the areas of Human Factors, operator actions, and procedures for normal, abnormal and emergency conditions.

GDC-19, Control Room, includes considerations for Human Factors in normal and accident conditions. The addition of GDC-19 to the PBAPS licensing basis came with the acceptance of AST in licensing amendments 269 (Unit 2) and 273 (Unit 3) (Reference 50).

As stated in UFSAR Section 13.3, PBAPS incorporates the requirements specified in ANSI N18.1-1971, 10 CFR 55, and 10 CFR 50 as promulgated in the NRC Final Rule 10 CFR 50.120 - "Training and Qualification of Nuclear Power Plant Personnel." The PBAPS training program is based on a systematic approach to training. The qualifications for licensed operators, including compliance with 10 CFR 55, are described in UFSAR Section 13.2. The operator training program is accredited by INPO.

PBAPS I&C systems are described in UFSAR Section 7, "Control and Instrumentation."

10 CFR 50 Appendix R approved operations that may be required to be performed outside the Control Room (CR) are contained in UFSAR Fire Protection Program, Appendix A, Table A-4.

Technical Evaluation

Human factors engineering and human performance initiatives are foundational characteristics that help ensure that plant operators can effectively and safely operate the facility under normal, abnormal, and emergency conditions. When initiating a plant change, the PBAPS configuration control process requires a review of human factors including the effect of a modification on EOPs, CR layout, alarms, indication and function. It also includes a review by qualified personnel to determine any effect on the simulator that would entail simulator modifications or modeling changes.

2.11.1.1 Changes in Emergency and Abnormal Operating Procedures

The changes in EOPs and the SAMPs reflect the change in power level and CAP credit elimination but will not be changed in a manner that involves a change in accident mitigation philosophy.

The following EOP curves and limits have been identified as being affected:

- Heat Capacity Temperature Limit (HCTL) - The EPU will result in additional heat being added to the SP during certain accident scenarios. The HCTL curve will be revised as a result of the increase in decay heat rejected to the SP. The change is not significant (approximately 1°F).

- Pressure Suppression Pressure (PSP) - The PSP Curve will be revised as a result of the increase in reactor power and in decay heat loading. The change is not significant (<1 psi).

- Minimum Debris Retention Injection Rate (MDRIR) – The MDRIR will be revised as a result of the increase in decay heat loading. The injection flow will increase by approximately 12.5% of the CLTP flow.

- NPSH: The NPSH curves for RHR and CS pumps will be revised due to utilization of the $NPSHR_{3\%}$ curves.

- Hot Shutdown Boron Weight (HSBW) and Cold Shutdown Boron Weight (CSBW): The percentage of SLC tank volume required to achieve HSBW and CSBW will change due to the increase in Boron enrichment.

The following EOPs are planned to be revised as a result of EPU and CAP credit elimination: (The modifications mentioned can be found in EPU LAR Attachment 9):

- T-101 and Bases, RPV CONTROL, are affected by both the CST and the Condensate Pump modifications.

- T-102, and Bases, PRIMARY CONTAINMENT CONTROL, are affected by the following three modifications: RHR heat exchanger cross-tie, HPSW cross-tie, and the CST.

- T-111 and Bases, LEVEL RESTORATION, are affected by the CST modification.

- T-117 and Bases, LEVEL / POWER CONTROL, are affected by the SLC boron enrichment modification.

- T-204-2(3), INITIATION OF CONTAINMENT SPRAYS USING RHR, and T-205-2(3), INITIATION OF CONTAINMENT SPRAYS USING HPSW, are affected by the RHR heat exchanger cross-tie modification.

- T-210-2(3) CRD SYSTEM SBLC INJECTION, T-211-2(3), CRD SYSTEM NONENRICHED BORIC ACID AND BORAX INJECTION, and T-212-2(3), RWCU SYSTEM SBLC INJECTION, are affected by the SLC boron enrichment modification.

- T-242-2(3), ALTERNATE INJECTION USING THE REFUELING WATER TRANSFER SYSTEM, are affected by the modification to the condensate filter demineralizers.

- T-246-2(3), MAXIMIZING CRD FLOW TO THE REACTOR VESSEL, are affected by the CST modification.

AOPs at PBAPS are defined as Off-Normal Procedures (ONs), Operational Transient Procedures (OTs), Special Event Procedures (SEs), and **T-300 Series Fire Guides (FGs)** ~~Fire Safe Shutdown Directives (FSSDs)~~. The planned changes to AOPs due to EPU and CAP credit elimination modifications are outlined below.

- ON-118 and Bases, LOSS OF TURBINE BUILDING CLOSED COOLING WATER (TBCCW) SYSTEM & BASES affect the bearing temperatures for the condensate pumps and load limitations on the isolated phase bus for loss of TBCCW. This will be affected by the condensate pump and the isolated phase bus modifications.

- OT-106 and Bases, CONDENSER LOW VACUUM, is being revised due to changes in the MC low vacuum alarm setpoint.
- OT-111 and Bases, REACTOR LOW PRESSURE, will be affected by changes to condensate pump discharge pressure resulting from the pump modification.
- OT-113 and Bases, LOSS OF STATOR COOLING & BASES will be affected by changes to the operating temperature alarms due to the T-G modification.
- SE-10 and Bases, ~~FIRE SAFE~~ **PLANT** SHUTDOWN FROM THE ~~REMOTE S/D~~ **ALTERNATIVE SHUTDOWN** PANELS will be affected by the **CAP credit elimination strategy, RHR heat exchanger cross-tie modification and** CST modification.
- SE-11 and Bases, LOSS OF OFF-SITE POWER is affected by the RHR heat exchanger cross-tie, and CST modifications.
- SE-16 and Bases, GRID EMERGENCY is being revised as a result of the change in MVAR capacity due to the T-G modification.
- **T-300 Series Procedures and Bases, FIRE PROTECTION will be affected by the RHR heat exchanger cross-tie modification.**

EOPs and AOPs will also be rescaled as required to reflect the power uprate.

2.11.1.2 Changes to Operator Actions Sensitive to Power Uprate

Most abnormal events result in automatic plant shutdown (scram). Some abnormal events result in SRV actuation, ADS actuation and/or automatic ECCS actuation. All analyzed events result in safety-related SSCs remaining within their design limits. EPU does not change any automatic safety function. Changes to subsequent operator action for maintaining core cooling, containment cooling, and safe shutdown are described below:

2.11.1.2.1 Changes for DBAs and Events

The following are changes for operator response time or manual actions for DBAs and events for all modes of RHR. These changes are the result of EPU and CAP credit elimination during these events.

- A new operator action will be created to place the RHR heat exchanger cross-tie valve in service if required to mitigate a rise in suppression pool temperature during the accident or event. This action has been evaluated from a human engineering standpoint and it has been determined to be consistent with current strategy for operator actions.
- A new operator action will be created to start a second HPSW Pump and establish a flowpath through the second RHR Heat Exchanger when the RHR heat exchanger cross-tie is in service. In connection with this, there will be an operator action to place the HPSW cross-tie in service if required. These actions have been evaluated from a human engineering standpoint and it has been determined to be consistent with current strategy for operator actions.

- As part of the CAP credit elimination strategy, operators will manage entry into ASDC, when required, to ensure that suppression pool temperature remains below the limit needed to maintain adequate NPSH for operating ECCS pumps. This will be accomplished by providing guidance in the ASDC procedure for the operator to anticipate a 10°F rise in suppression pool temperature upon initiation of ASDC, and to verify that ECCS pump operation will remain within the limits of the NPSH curves.

- As part of the CAP credit elimination strategy and managing the interaction between units, operators will control the depressurization of the units to minimize the impact of a rise in suppression pool temperature associated with the interruption of containment cooling (SPC or sprays) that occurs upon receipt of a LOCA signal. Guidance will be provided for the operators to anticipate the rise in suppression pool temperature resulting from an interruption in SPC caused by receiving a LOCA signal when a unit is depressurized to less than 450 psig. The operators will then use the higher suppression pool temperature to verify that the ECCS pump operation will remain within the limits of the NPSH curves during the interruption in containment cooling.

2.11.1.2.2 Appendix R Fire Safe Shutdown (FSSD) Events

There are four methods designed to bring the plant to a cold shutdown condition for a postulated fire event. The RHR Cross Tie Modification is not relied upon in these methods.

- Safe Shutdown Method "A" utilizes the RCIC system, two SRVs, and one subsystem of RHR.

- Safe Shutdown Method "B" utilizes the HPCI system, two SRVs, and one subsystem of RHR.

- Safe Shutdown Method "C" utilizes manual control of three SRVs of the ADS for depressurization of the reactor, and either one CS pump or one RHR pump in both LPCI mode and the SPC mode.

- Alternative Shutdown Method "D" utilizes similar systems as ~~m~~**Method** "B" except that operator control is taken outside the CR at designated alternative **shutdown (ASD) panels** ~~control stations~~.

The following changes in operator action and/or response times are required for FSSD events due to the CAP credit elimination. All of the operator actions below went through a qualitative review with the Operations and Training Departments. In addition, Method D was reviewed utilizing the station CR simulator.

- Operating procedures will require the operators to refill the CST from the RWST during Method “A”, “B” and “D” shutdowns to **provide inventory for the HPCI or RCIC system. The HPCI and RCIC pumps** maintain ~~ECCS pump~~ suction on the CST rather than the suppression pool and ensure NPSH margin without the need for CAP credit (see EPU LAR Attachment 9 Section 3.2, Overview of Improvement in NPSH Margin and CAP Credit Elimination). Because this will occur about 3 hours after the event and the fire is assumed to be extinguished at one hour, operators would not be hampered from reaching the necessary manual valves to perform the action.

- Operating procedures will be revised to provide guidance to manage entry into ASDC in a manner that will mitigate the effect of the rise in suppression pool temperature associated with ASDC initiation in order to maintain NPSH margin for the operating ECCS pumps.

- **Operating procedures will be revised to direct the operators to perform new actions to operate key-lock switches in the CR to inhibit Unit 2 RCIC, and Unit 3 HPCI and RCIC pump automatic suction swap, as applicable, for a fire in certain fire areas.**

- Operating procedures will be revised to reduce the time in which an operator is required to secure, from the CR, a HPCI pump that has spuriously started from 10 to 7.5 minutes during a Method "A" shutdown without a SORV.

- During a Method "A" shutdown with a SORV, **the time by which an operator must initiate ASDC is unchanged from the current Method "A" requirement of 180 minutes**. ~~the EPU analysis has determined that the time for entry into ASDC is reduced from 210 to 160 minutes. The most challenging of these actions involve establishing SPC. It has been determined that one operator can complete these actions in a maximum of 120 minutes including travel times. Additional operators can be used to reduce the time further.~~

- During Method "C" shutdowns, the EPU analysis has determined that the times for initiation of ASDC has increased from 30 minutes to 14 hours while the time after the event in which the operator must initiate RPV depressurization **from the CR** has decreased from 27.5 to 26.5 minutes for case C1 and 15 minutes to 14.7 minutes for case C2. **These slight decreases in the time of RPV depressurization result in slightly earlier times for low pressure makeup (CS and RHR LPCI Mode).** However, the actions required for RPV depressurization can all be completed within the new timeframe from the CR.

- During Method "D" shutdowns, without a SORV, the EPU analysis has determined that the times for initiation of ASDC has increased from 300 to 364 minutes while the time after the start of the event in which the operator must initiate RPV depressurization **from the ASD panel** has decreased from 5 to 3.5 hours. This is acceptable because, per procedures, operators will depressurize while maintaining acceptable vessel temperature.

- During Method "D" shutdowns, with a SORV, the EPU analysis has determined that the time after the event for initiation of SPC **from the ASD panel** has decreased from 4 to 2.5 hours, while without a SORV the time for initiation of SPC has decreased from 180 to 150 minutes. However, a single operator is able to complete required actions in 2 hours or less.

- During Method "D" shutdowns, with a SORV, ASDC initiation time is increased from 240 to 270 minutes.

- **New operator actions are required for Method "D" to address use of new transfer/isolation switches installed on the ASD panels to isolate the control circuits for the 2B and 3D MCC Compartments remote (i.e., CR) transfer switches and align these MCCs to their normal power supplies. In each of these cases no time challenges were identified that would prevent completion of these actions in accordance with the revised response time.**

- **New operator actions are required for Method "D" to address use of new control switches on the ASD Panels for the B Loop RHR heat exchanger cross-tie MOV's, and their associated transfer/isolation switches in emergency bus room panels, to isolate the ASD panel control circuits from control circuits in the CR. In this case no time challenges were identified that would prevent completion of these actions in accordance with the revised response time.**

- **New operator actions are required for Method "D" to direct the operators to ensure the new RHR flow control valves (MO-2-10-2677B & MO-3-10-3677D) are fully open by manually opening these valves at their respective MCC Compartment breaker by**

manipulating the motor contactor and then opening the breakers to preclude spurious mispositioning. In this case no time challenges were identified that would prevent completion of these actions in accordance with the revised response time.

In recognition that multiple manual actions in support of FSSD functions may be required of operators during response to fire events, a review of the operator timeline analyses included in the FSSD calculations was performed. This review assessed the actions required to initiate ASDC, initiate SPC, depressurize the RPV, and provide makeup inventory to the CST including the new and revised operator actions discussed above. No fire areas were identified where operator availability or time constraints would prevent completion of the required actions in accordance with the revised response times.

2.11.1.2.3 Anticipated Transient Without Scram Event

A new operator action will be created to refill the CST from the RWST about 90 minutes after the start of the event. This is a reasonable action because the reactor is shut down in approximately 30 minutes and the CST inventory would last for an additional hour at the estimated injection rate.

2.11.1.2.4 Conclusion

The changes to PBAPS Unit 2 and 3 operator actions as a result of the EPU do not significantly affect operator actions. The changes will be appropriately revised in the procedures and the operators will receive appropriate classroom and/or simulator training for implementation. There are no new or revised operator workarounds as a result of EPU.

2.11.1.3 Changes to CR Controls, Displays and Alarms

Changes to the CR are prepared in accordance with the plant design change process. Under this process, a Human Factors engineering review is performed for changes associated with the PBAPS CR. The change process also requires an effects review by Operations and Training personnel. Results of these reviews, including simulator effects and training requirements, are incorporated into the engineering change package and tracked to completion by the design change process.

The following changes will be made to the CR Controls, Displays and / or Alarms resulting from EPU:

- A switch and position indicating lights will be provided for the new RHR heat exchanger cross-tie MOV controls in each division of RHR and for each of the new flow control valves at the inlets to the RHR heat exchangers. New cross tie flow indicators allow operators to balance flow through the heat exchangers when operating with the RHR heat exchanger cross-tie open.

- Position indicating lights will be provided to indicate RHR flow control valve position corresponding to minimum and maximum allowable flow. An alarm will also be provided to indicate when the valve is outside of the allowable flow range.

- A new selector switch is provided for manually controlling the transfer of power for the HPSW cross-tie MOV from the Normal to Alternate source or vice versa. The indicating lights will show if power is available on the Normal and Alternate sources. **Annunciator windows will be provided in the control room to alert the operators when any of the transfer switches has an off-normal condition.**

- The T-G and auxiliaries modifications will require changes to CR controls and alarms due to the upgrades to the Alterex rectifier, and voltage regulator.

- The addition of the third MS SSV will include valve instrumentation (acoustic monitor and temperature element). The instrumentation indication will be available in the CR. Instrumentation and alarms for the new SSV will be consistent with that of the existing SSVs.

- **Key-lock control switches will be provided to give the operators the capability of manually inhibiting Unit 2 RCIC, and Unit 3 HPCI and RCIC pump automatic suction swap, as applicable, for a fire in certain fire areas. Annunciator windows will be provided in the control room to alert the operators when any of the key-lock switches has an off-normal condition.**

- **A transfer switch control switch is provided for manually controlling the transfer of power from the Normal to Alternate source or vice versa for each of the four new MCC Compartments per unit associated with powering the motor-operated RHR flow control valves, RHR heat exchanger cross-tie valves, and the RHR heat exchanger HPSW outlet valves. The indicating lights will show if power is available on the Normal and Alternate sources. Annunciator windows will be provided in the control room to alert the operators when any of the new MCC Compartments with transfer switches has an off-normal condition.**

TS Instruments for instrument and control systems are affected by EPU as described in EPU LAR Attachments 1 and 2.

2.11.1.3.1 Conclusion

The changes to PBAPS CR interfaces as a result of the EPU do not significantly affect operator human performance. Operator training for changes to CR interfaces, alarms, and indications will be accomplished in accordance with the plant training and simulator program as described in section 2.11.1.5.

2.11.1.4 Changes to the Safety Parameter Display System

The purpose of the PBAPS Safety Parameter Display System (SPDS) is to continuously display information from which plant safety status can be readily and reliably assessed. The principal function of the SPDS is to aid CR personnel during abnormal and emergency conditions in determining the safety status of the plant and in assessing whether abnormal conditions warrant corrective action by operators to avoid a degraded core.

The following changes will be made to the SPDS as a result of PBAPS EPU:

- HCTL curve: The HCTL curve will be revised as a result of the decay heat rejected to the suppression pool.

- PSP curve: The PSP curve will be revised as a result of the increase in reactor power and in decay heat loading.

- ~~MDRIR: The MDRIR will be revised as a result of the increase in decay heat loading~~NPSH: The NPSH curves for RHR and CS pumps will be revised due to utilization of the 3% NPSH curves.

- Position indication will be provided for the additional third SSV in each unit.

- RHR flow indication for each of the RHR subsystems. The display will show RHR flow rate through each subsystem effectively showing flow through the RHR cross tie piping.

- **The percentage of Standby Liquid Control (SLC) tank volume required to achieve HSBW will change due to the increase in Boron-10 enrichment.**

2.11.1.4.1 Conclusion

The changes to PBAPS Unit 2 and 3 SPDS as a result of the EPU do not significantly affect operator actions and mitigation strategies. The changes will be made in accordance with the configuration change process and the operators will receive appropriate classroom and/or simulator training for implementation.

2.11.1.5 Changes to the Operator Training program and the Control Room Simulator

Training of Operations personnel will occur on all EPU modifications necessary to support unit operation at EPU conditions. The operator training is presented in the classroom and on the simulator. The major EPU change for the CR operators, involves the installation of the RHR and HPSW cross-tie modifications (see Enclosures 9c and 9d to EPU LAR Attachment 9).

Licensed and non-licensed operator training will be provided prior to the cycle implementing the changes and will focus on plant modifications, procedure changes, startup test procedures, and other aspects of EPU including changes to parameters, set points, scales, and systems. The applicable lesson plans will be revised to reflect changes as a result of the EPU. Simulator training during this phase will also include training on performance effects of new modifications; this will support the power ascension plan. Prior to startup following the refueling outage for EPU, the operators will be given classroom and simulator Just-In-Time (JIT) training to cover last minute training items and perform startup training and startup testing evolutions on the simulator. Successful completion of training is verified, as required by plant procedures, as part of the turnover of the modification to operations.

The simulator is a duplicate of Unit 2 main control room and as such is modified when modifications affecting simulator fidelity are installed in the plant. Use of the simulator to support Unit 3 related training is performed when there are unit differences between the simulator and Unit 3. Classroom training is provided relative to the implementation of modifications to both PBAPS Units. Human errors are prevented through rigorous training in the classroom and plant settings prior to completion of modifications at each unit. The training includes evaluation tools such as written exams, simulator evaluations, and task performance tools as deemed appropriate.

Installation of the EPU changes to the simulator, are performed in accordance with ANSI/ANS-3.5 1998, "Nuclear Power Plant Simulators for Use in Operator Training and Evaluation." The simulator changes will include hardware changes for new and modified CR I&C, software updates for modeling changes due to EPU (i.e., reactor feed pump, condensate pump modifications), set point changes, and re-tuning of the core physics model for cycle specific data. The simulator process computer will be updated for EPU modifications.

Operating data will be collected during EPU implementation and start-up testing. This data will be compared to simulator data as required by ANSI/ANS- 3.5 1998. Additionally, simulator acceptance testing will also be conducted to benchmark the simulator performance based on design and engineering analysis data.

Lessons learned from power ascension testing and operation at EPU conditions will be fed back into the training process to update the training material and processes as required.

CONCLUSION

The changes to operator actions, human-system interfaces, procedures, and training required for the proposed EPU have been evaluated. It has been concluded that there is no adverse affect to the existing programs, procedures, training, and other plant design features related to operator performance during normal and accident conditions. It has been further concluded that the requirements of the current licensing basis, 10 CFR 50.120 (Training and Qualification of Nuclear Power Plant Personnel), and guidance in GL 82-33 (Supplement 1, NUREG 0737 Requirement for Emergency Response Capability) will continue to be met following implementation of the proposed EPU.

Under the design configuration change process, a Human Factors engineering review is performed for changes associated with the CR. The change process also requires an impact review by Operations and Training personnel. Results of these reviews, including simulator effect and training requirements, are incorporated into the engineering change package and tracked to completion by the design change process.