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10 CFR 50.90

May 20, 2004

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

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

Subject: Supplement to the Request for License Amendments Related to Application of Alternative Source Term, dated July 14, 2003

References: (1) Letter from M. P. Gallagher (Exelon Generation Company, LLC) to US NRC, dated July 14, 2003

(2) Letter from G. F. Wunder (U. S. Nuclear Regulatory Commission) to J. L. Skolds (Exelon Generation Company, LLC), dated January 16, 2004

(3) Guidance On The Assessment of a BWR SLC System For pH Control, February 12, 2004 (ADAMS Accession Number ML040640364)

This letter is being sent to supplement the License Amendment Request (LAR) to support application of an alternative source term (AST) methodology (Reference 1) at Peach Bottom Atomic Power Station (PBAPS), Units 2 & 3. This LAR proposed certain TS and TS Bases changes for PBAPS Units 2 & 3 as part of implementing an AST methodology.

In the Reference (3) document, the NRC provides guidance and methods for assessing the acceptability of reliance on the Standby Liquid Control (SLC) system to control the pH of the water in a boiling water reactor (BWR) suppression pool following a loss-of-coolant-accident (LOCA). Attachment 1 to this supplemental letter provides Exelon's response to the Guidance methods. Additionally, Attachment 2 to this supplemental letter provides additional detail to a response Exelon provided in a previous Request for Additional Information per Reference (2). Attachment 3 provides an update to Attachment 8 of the original submittal. This update includes additional detail concerning the Suppression Pool Temperature Profile provided as Figure 14.6.12A in the Peach Bottom UFSAR and discussed per Attachment 2 of this supplemental letter.

There is no impact to the No Significant Hazards Consideration submitted in the Reference 1 letter. There are no additional commitments contained within this letter.

A001
A053

If you have any questions or require additional information, please contact Doug Walker at (610) 765-5726.

I declare under penalty of perjury that the foregoing is true and correct.

Respectfully,

Executed on May 20, 2004

Keith R. Jury

Keith Jury
Director, Licensing and Regulatory Affairs
Exelon Generation Company, LLC

Attachments:
1. Exelon Response to the Guidance on the Assessment of a BWR SLC System for pH Control
2. Clarification of Response to Question 10 from RAI dated January 16, 2004
3. UFSAR Section 5.2.4.3.2 Mark-up (Revised Attachment 8 from original Peach Bottom AST submittal)

cc: H. J. Miller, Administrator, Region I, USNRC
C. W. Smith, USNRC Senior Resident Inspector, PBAPS
G. F. Wunder, Senior Project Manager, USNRC (by FedEx)
R. R. Janati - Commonwealth of Pennsylvania

ATTACHMENT 1

PEACH BOTTOM ATOMIC POWER STATION
UNITS 2 AND 3

Docket Nos. 50-277
50-278

License Nos. DPR-44
DPR-56

Supplement to License Amendment Request for
"PBAPS Alternative Source Term Implementation"

Exelon Response to the Guidance on the
Assessment of a BWR SLC System for pH Control

Review Guidelines

For the purposes of BWR AST applications, the function of the SLC system is to:

> Inject within 24 hours of a LOCA a sufficient amount of sodium pentaborate solution into the reactor vessel to maintain suppression pool pH ≥ 7.0 for 30 days.

To demonstrate that the SLC system is capable of performing its AST function, the SLC system should meet the following guidelines:

1. The SLC system should be classified as ESF grade in accordance with 10 CFR 50.34(b) or as a safety-related system as defined in 10 CFR 50.2, and satisfy the regulatory requirements for such systems.

   There may be plants with an SLC system which is not classified as safety-related or as ESF grade. In such instances, the staff reviewer will determine whether the SLC system is comparable to a system classified as safety-related or ESF. A SLC system meeting items (a)-(e) below would result in its acceptance in support of a 10 CFR 50.67 request even if the system is not classified as safety-related or as ESF grade.

   (a) The SLC system should be provided with standby AC power supplemented by the emergency diesel generators.

   (b) The SLC system should be seismically qualified in accordance with Regulatory Guide 1.29 and Appendix A to 10 CFR Part 100.

   (c) The SLC system should be incorporated into the plant's ASME Code ISI and IST Programs based upon the plant's code of record (10 CFR 50.55a).

   (d) The SLC system should be incorporated into the plant's Maintenance Rule program consistent with 10 CFR 50.65.

   (e) The SLC system should meet 10 CFR 50.49 and Appendix A (GDC 4) to 10 CFR 50.

   RESPONSE

   The SLC System is a safety related system and meets the criteria of (a) – (e) above.

2. The licensee should have plant procedures for injecting the sodium pentaborate using the SLC system. This information would be reviewed by the appropriate technical review branch, as requested by the lead SPSB reviewer.

   (a) A review of the procedures may be appropriate if a reliability approach is taken (4(a) below) due to timing considerations for the injection of chemicals.

   RESPONSE: A procedure change is being drafted, and will be provided when available.

   (b) The SLC activation steps are placed in a safety-related plant procedure.

   RESPONSE: SLC System activation steps will be incorporated in Emergency Operating Procedure T-102, "Primary Containment Control".

(c) The steps be activated by parameters that are symptoms of imminent or actual core damage.

RESPONSE: Appropriate steps in T-102 will direct the initiation of the SLC System if containment radiation level reaches 10,000 R/hr, which is indicative of actual core damage based on previously approved plant calculations.

(d) The instrumentation relied upon to provide this indication meets the quality requirements for a Type E variable as defined in RG 1.97 Tables 1 and 2

RESPONSE: The instruments used to provide this indication are RR-8(9)103A,B, which are listed under Peach Bottom Tech Spec 3.3.3.1, "Post Accident Monitoring Instrumentation." Instruments RR-8(9)103A,B are classified as Type E variable components as defined by Regulatory Guide 1.97 Table 1.

(e) Personnel receive initial and periodic refresher training in the procedure.

RESPONSE: As part of the EOPs, the Licensed Operators will receive initial and periodic refresher training on T-102 and consequently the steps that direct initiation of SLC for pH control.

(f) Other plant procedures (e.g., ERGs/SAGs) that call for termination of SLC as a reactivity control measure are appropriately revised to enable SLC injection for pH control.

RESPONSE: EOP (ERG) steps that would direct termination of SLC as a reactivity control measure (i.e. "WHEN an ATWS is no longer in progress, THEN terminate boron injection...") are being revised such that if SLC injection is directed for pH control (containment radiation of 10,000 R/hr) it is not removed from service.

SAMP (SAG) procedures have been reviewed, the procedures direct the termination of SLC only when tank level drops to 0 % for the purpose of protecting SLC equipment. Therefore, the SAMP procedures are not required to be revised.

3. A sufficient concentration and quantity of sodium pentaborate should be available for injection into the reactor vessel to control pH in the suppression pool.

The source term analysis is tied to the plant's design basis accident, which is the large break LOCA, a break of a recirculation pipe. The licensee needs to demonstrate that within 24 hours there is adequate recirculation between the suppression pool and the reactor vessel through flow out the break to provide transport and mixing, consistent with the assumptions in the chemical analyses..

RESPONSE

Part I - Suppression Pool pH Analysis Assumptions, Inputs, Methods, and Results

The calculation of suppression pool pH is based on the previously approved methodology developed for the calculation done for the Grand Gulf Nuclear Station, Unit 1 as revised December 2000. The accuracy of translation of the equations in these documents into spreadsheet cell formulas was verified by duplicating the Grand Gulf calculation.

Injection of sodium pentaborate solution by the Standby Liquid Control System is a required function in order to control post-LOCA pH in the suppression pool and prevent iodine re-evolution. Based on the worst-case beginning of cycle condition, injection should be completed within 24 hours after the start of the DBA-LOCA. Therefore, manual initiation is acceptable. Manual initiation of SLC is expected early in a DBA-LOCA as a result of emergency procedures for events resulting in fuel damage.

Acceptance Criteria: Per the guidance of Appendix A of Regulatory Guide 1.183, the Suppression Pool pH should be controlled at values of 7 or greater following loss of coolant accidents.

Assumptions/Engineering Judgments

- The Suppression Pool is assumed to be well mixed so that the pH at any time can be represented by a single value.
- Cable parameters includes the exposed termination length of what is in a raceway. As a conservative estimate of the cable lengths in free air, an additional 5% of the raceway's totals were assumed to be in free air. A 10% contingency on the cable surface is also included. Radiolysis of surface coatings on the steel and concrete surfaces in the Drywell and Containment would not be significant contributors, since the coatings utilize non-chlorinated polymers.

Temperature

Suppression Pool temperatures are taken from UFSAR, Rev.15 Figure 14.6.12A. Since this revised curve extends only to 14 hours, the older UFSAR, Rev. 14 curve, Figure 14.6-12, which extends the data to 278 hours, was used and extrapolated to 720 hours.

Extrapolation of the semi-log plot is acceptable since the calculated pH is rather insensitive to temperature. For example, at 30 days (720 hours) it requires a 36 °F increase to reduce the pH by 0.1.

Sodium Pentaborate mass in SLC Tank

Per Technical Specification SR 3.1.7.7, the minimum B-10 stored in the SLC tank is 162.7 lbs. In order to prepare this calculation, total boron (B-10 and B-11) is needed. The highest enrichment used at Peach Bottom is 63.5 atom % B-10. For this calculation, 65 atom % B-10 enrichment is assumed. Since B-10 has an atomic weight of 10.01, this gives 7373 gram-atoms of B-10 and 11,342 gram atoms of total boron. Since the formula of Sodium Pentaborate is $Na_2B_{10}O_{16} \cdot 10H_2O$, there are 1134 gram-mols of the pentaborate in the SLC Tank.

Suppression Pool Volume

The maximum suppression pool volume is limiting with respect to the calculation pH results. For this analysis, a beyond design basis value of 151,488 cubic feet is used. This value is the "Maximum Pressure Suppression Primary Containment Water Level" that corresponds to the bottom of the vent ring header (17.1 ft) in the torus, and provides a limited additional margin for beyond design basis accident water additions. The above value exceeds that which corresponds to the total of the TS suppression pool maximum water level (14.9 ft) plus water in the vessel and attached piping, as discussed in and used for the response that follows on adequacy of early mixing of the SLC solution with suppression pool water.

Hydriodic Acid Production
Iodine, accompanied by Cesium, is released during the Gap Release and Early In-Vessel Release phases.

The following equation, valid during the Early Vessel Release Phase, includes the release during the Gap Release Phase.

Iodine and cesium core inventories are calculated for both beginning and end of cycle (BOC and EOC) conditions. Since EOC conditions result in increased inventory of both acidic (iodine) and basic (cesium) compounds, pH values are calculated for both conditions. For conservatism, the EOC radiation doses are used for the BOC calculation.

The hydriodic acid concentration is governed by the following equation:

$$[HI](t) = m_I / (120 * V_{POOL}) * [t - (0.5 + t_{gap})] + m_I / (400 * V_{POOL}) \qquad \text{[Equation 1]}$$

where:

$[HI](t)$ = concentration of Hydriodic Acid at time t (moles/liter)
m_I = core iodine inventory (gram-moles)
V_{POOL} = Suppression Pool volume (liters)
t = time after start of accident (hrs) (includes t_{gap} + Gap Release [0.5 hrs] + Early In-Vessel Release [1.5 hrs] durations for a t_{max} = 2.0336 hrs)
t_{gap} = time of onset of gap release = 121 seconds = 0.0336 hrs
t_{max} = 2.0336 hrs = end of Early In-Vessel Release

Nitric Acid Production
Nitric Acid is produced by radiolysis of the water in the Suppression Pool with a G value of 0.007 molecules HNO_3 / 100 eV absorbed dose or 7.3E-6 g moles / megarad- liter.

The nitric acid concentration is governed by the following equation:

$$[HNO_3](t) = 7.3E\text{-}6 * D(t)_{pool} \qquad \text{[Equation 2]}$$

where:

$[HNO_3](t)$ = nitric acid concentration at time t (moles/liter)
$D(t)_{pool}$ = Total accumulated dose in Suppression Pool at time t (megarad)

Hydrochloric Acid Production
Hydrochloric Acid is produced by radiolysis of chlorinated polymer cable jacketing. Radiolysis of surface coatings on the steel and concrete surfaces in the Drywell and Containment would not be significant contributors, since the coatings utilize non-chlorinated polymers.

The calculation of the resulting concentration in the Suppression Pool is based on the equations in the GGNS Calculation. These equations are in turn based on the following G value for HCl production in Hypalon chlorinated polymer.

G_{HCl} = 2.115 molecules/100eV = 3.512E-20 g moles HCl / MeV

The hydrochloric acid concentration is governed by the following equations:

Doses from beta and gamma radiation are calculated separately.

$$[HCl]_\beta(t) = G_{HCl} / V_{POOL} * (S_{tray} / 2 + S_{fa}) / \mu_{\beta\ air} * D_\beta(t)$$ [Equation 3]

where the effective cable surface area for β dose is:

$$S_{tray} / 2 + S_{fa} = \pi * D_0 * (L_{tray} / 2 + L_{fa})$$

$$[HCl]_\gamma(t) = G_{HCl} / V_{POOL} * (S_{tray} + S_{fa}) * (1 - e^{-\mu\lambda\ air * r\lambda}) / \mu_{\gamma\ air} * (1 - e^{-\mu\lambda\ Hypalon * th}) * D_\gamma(t)$$ [Equation 4]

where:

$S_{tray} + S_{fa} = \pi * D_0 * (L_{tray} + L_{fa})$
$[HCl]_\beta(t)$ = HCl concentration from Beta radiation at time t (g moles/liter)
$[HCl]_\gamma(t)$ = HCl concentration from Gamma radiation at time t (g moles/liter)
D_0 = cable diameter (cm)
L_{tray} = cable length in trays (raceways) (cm)
L_{fa} = cable length in free air (cm)
$\mu_{\beta\ air}$ = linear beta absorption coefficient in air (1/cm)
$\mu_{\lambda\ air}$ = linear gamma absorption coefficient in air (1/cm)
r_λ = gamma free path (cm)
$\mu_{\lambda\ Hypalon}$ = linear gamma absorption coefficient in Hypalon (1/cm)
th = Hypalon jacket thickness (cm)
$D_\beta(t)$ = accumulated beta dose per unit volume at time t (MeV/cm^3)
$D_\gamma(t)$ = accumulated gamma dose per unit volume at time t (MeV/cm^3)
G_{HCl} = 3.512E-20 (g moles HCl / MeV)
V_{POOL} = Suppression Pool volume (Liters)
S_{tray} = Cable surface area in trays (cm^2)
S_{fa} = Cable surface area in free air (cm^2)

Cesium Hydroxide Production

Cesium, accompanied by iodine, is released during the Gap Release and Early In-Vessel Release phases. The following equation, valid during the Early Vessel Release Phase, includes the release during the Gap Release Phase.

Iodine and cesium core inventories are calculated for both beginning and end of cycle (BOC and EOC) conditions. Since EOC conditions result in increased inventory of both acidic (iodine) and basic (cesium) compounds, pH values are calculated for both conditions. For conservatism, the EOC radiation doses are used for the BOC calculation.

The cesium hydroxide concentration is governed by the following equation:

$$[CsOH](t) = (0.4 * m_{Cs} - 0.475 * m_I) / 3 * V_{POOL}) * [t - (0.5 + t_{gap})] + (0.05 * m_{Cs} - 0.0475 * m_I) / V_{POOL}$$ [Equation 5]

where:

[CsOH](t) = concentration of Cesium Hydroxide at time t (g moles/liter)

m_I = core Iodine inventory (gram-moles)
m_{Cs} = core Cesium inventory (gram-moles)
V_{POOL} = Suppression Pool volume (liters)
t = time after start of accident (hrs) (includes t_{gap} + Gap Release [0.5 hrs] + Early In-Vessel Release [1.5 hrs] durations for a t_{max} = 2.0336 hrs) [per, Table 4, page 1.183-15]
t_{gap} = time of onset of gap release = 121 seconds = 0.0336 hrs
t_{max} = 2.0336 hrs = end of Early In-Vessel Release

Part II– Adequacy of Mixing

The Emergency Core Cooling System (ECCS) takes water from the suppression pool and pumps it into the core region of the reactor vessel. Additionally, the SLC System will pump from the SLC Tank (with a minimum 2,538 gallon capacity) into the core region of the reactor vessel. This water will refill the Reactor Pressure Vessel (RPV) under post-LOCA conditions, and the mixed ECCS water and SLC solution will spill out of the break to the suppression pool. To illustrate the adequacy of SLC solution mixing in the suppression pool, bounding calculations are done for the maximum initial liquid volume of the suppression pool or 127,300 ft^3, per PBAPS UFSAR Table 5.2-1. An electrical failure is assumed resulting in one residual heat removal (RHR) system loop and one core spray (CS) system loop available for containment spray and RPV flooding. One RHR loop (2 pumps) in the Low-Pressure Coolant Injection System is capable of injecting a minimum of 20,000 gpm, and one CS loop (2 pumps) is capable of injecting a minimum of 6,250 gpm in the Low Pressure Core Spray System mode, per PBAPS UFSAR Table 6.3-1. A two-hour time delay before ECCS and SLC initiation to refill the RPV is conservatively assumed, consistent with the event timing in Regulatory Guide 1.183.

After 2 hours, simultaneous injection of sodium pentaborate solution and ECCS fill of the RPV take place. The PBAPS RPV and attached pipes have a volume of 14,000 ft^3. This volume would be flooded within 5.24 minutes utilizing only the minimum ECCS flows above. The minimum flow rate of the SLC pump is not credited in this fill time, but it is noted that 100% injection of the minimum sodium pentaborate solution would occur within 65 minutes. The bottom of the drywell would already be flooded from the RPV blowdown.

Based on the 127,300 ft^3 Suppression pool volume plus the entire RPV and attached pipes 14,000 ft^3 volume (for a total of 141,300 ft^3) and a total minimum 26,250 gpm (210,540 ft^3/hour) flow rate, a turnover of one suppression pool volume containing essentially 100% of the SLC injection is calculated to be completed in less than 2 hours after the LOCA, with subsequent suppression pool turnovers of the suppression pool volume taking place every 0.6 hours. Thus, the mixing assumption of the Part I analysis is assured.

4. The SLC system should not be rendered incapable of performing its AST function due to a single failure of an active component. For this purpose the check value is considered an active device for AST since the check valve must open to inject sodium pentaborate for suppression pool pH control.

If the SLC system can not be considered redundant with respect to its active components, this lack of redundancy may be offset if the licensee can satisfy (a) or (b) or (c) below:

(a) Acceptable quality and reliability of the non-redundant active components and/or compensatory actions in the event of failure of the non-redundant active components.

Under this approach, the licensee should provide the following information in justifying the lack of redundancy of active components in the SLC system:

(1) The licensee should identify the non-redundant active components in the SLC system and provide their make, manufacturer, and model number. The staff reviewer will compare this information with performance data for the component from industry data bases and other sources.

(2) The licensee should provide the design-basis conditions for the component and the environmental and seismic conditions under which the component may be required to operate during a design-basis accident. Environmental conditions include design-basis pressure, temperature, relative humidity and radiation fields. The staff reviewer will compare the environmental and seismic conditions associated with the design-basis accident to the conditions for which the component was designed to determine whether the component is capable of performing its intended function.

(3) The licensee should indicate whether the component was purchased in accordance with Appendix B to 10 CFR Part 50. If the component was not purchased in accordance with Appendix B, the licensee should provide information on the quality standards under which it was purchased. For the latter situation, information on the component would be reviewed by the appropriate technical review branch responsible for the component, as requested by the lead SPSB reviewer.

(4) The licensee should provide the performance history of the component both at the licensee's facility and in industry databases such as EPIX and NPRDS. The staff reviewer will use this information to evaluate the reliability of the component relative to other components used in safety-related applications.

(5) The licensee should provide a description of its inspection and testing program including standards, frequency, and acceptance criteria. The staff reviewer will use this information to evaluate the licensee's activities to monitor the component's performance at the facility. The information on the component would be reviewed by the appropriate technical review branch responsible for the component, as requested by the lead SPSB reviewer.

(6) The licensee should also indicate potential compensating actions that could be taken within an acceptable time period to address the failure of the component. An example of a compensating action might be the ability to jumper a switch in the control room to overcome its failure. The staff reviewer will consider the availability of compensating actions and the likelihood of successful injection of the sodium pentaborate where non-redundant active components fail to perform their intended functions.

(b) An alternative success path for injecting chemicals into the suppression pool.

If the licensee chooses to address the SLC system's susceptibility to single failure by selecting an alternative injection path, the alternative path must be capable of performing the AST function noted above and all components which make up the alternative path should meet the same quality characteristics required of the SLC system (described in Items 1(a)-1(e), 2 and 3 above). When the staff determines that an alternative path is acceptable, the staff's safety evaluation should address the manner in which the SLC system and the alternative path met Items 1(a)-1(e), 2 and 3 above.

If the use of an alternate path is part of the EOPs, then the license amendment needs to address the following items: (1) Does the alternate injection path require actions in areas outside the control room? (2) How accessible will these areas be? (3) What additional personnel will be required?

(c) 10 CFR 50.67 and Appendix A, General Design Criterion (GDC) 19 doses are met even if pH is not controlled.

The licensee may demonstrate, through dose calculations, that 10 CFR 50.67 and GDC 19 doses are met even if pH is not controlled. The re-evolution of iodine in the particulate form from the water in the suppression pool to the elemental form for airborne iodine must be incorporated into the calculation. The calculation may take credit for the mitigating capabilities of other equipment, for example the standby gas treatment system (SGTS), if such equipment would be available. The staff will perform calculations to confirm the licensee's conclusions. If the acceptability of the facility's dose calculations was based on the utilization of certain ESF equipment, for example the SGTS, then the staff's safety evaluation should reflect this. Such a citation is necessary to assure that it is recognized and documented that there is a link between the particular ESF component's performance and the SLC system's susceptibility to single failure .

RESPONSE:

The SLC System is functionally redundant to the control rods in achieving and maintaining the Reactor subcritical. Based on this functional redundancy the SLC System as a system by itself is not required to meet single failure criteria, therefore, the SLC System can not be considered redundant with respect to its active components.

Step 4 of this document states," If the SLC system can not be considered redundant with respect to its active components, this lack of redundancy may be offset by providing information in (a) or (b) or (c)..." Therefore, information will be provided to support option (a) for each of the identified components below.

I. Check Valves - CHK-2(3)-11-16

(1) The licensee should identify the non-redundant active components in the SLC system and provide their make, manufacturer, and model number. The staff reviewer will compare this information with performance data for the component from industry data bases and other sources..

RESPONSE:

Component: Check Valves - CHK-2(3)-11-16, "SLC DISCH HEADER TO RPV OUTBD CHK UPSTRM PENE N-42"

Make: 1-1/2",MARK N953M3RY

Manufacturer: FLOWSERVE CORPORATION

Model Number: W8421981 DWG

(2) The licensee should provide the design-basis conditions for the component and the environmental and seismic conditions under which the component may be required to operate during a design-basis accident. Environmental conditions include design-basis pressure, temperature, relative humidity and radiation fields. The staff reviewer will compare the environmental and seismic conditions associated with the design-basis accident to the conditions for which the component was designed to determine whether the component is capable of performing its intended function.

RESPONSE:

Environmental Conditions:
Maximum Post LOCA Temperature = 151 degrees F
Worst Case HELB conditions = 185 degrees F
Maximum Pressure = 15 psia
Relative Humidity = 100%
180 day LOCA dose = 2.29 x 10^5 rads

Seismic Conditions:
Maximum Credible Earthquake

(3) The licensee should indicate whether the component was purchased in accordance with Appendix B to 10 CFR Part 50. If the component was not purchased in accordance with Appendix B, the licensee should provide information on the quality standards under which it was purchased. For the latter situation, information on the component would be reviewed by the appropriate technical review branch responsible for the component, as requested by the lead SPSB reviewer.

RESPONSE: Yes, the component was purchased IAW Appendix B to 10 CFR Part 50.

(4) The licensee should provide the performance history of the component both at the licensee's facility and in industry databases such as EPIX and NPRDS. The staff reviewer will use this information to evaluate the reliability of the component relative to other components used in safety-related applications:

RESPONSE: Component Performance History at Peach Bottom:
Local Leak Rate failures for containment isolation purposes occurred: 05/30/87 (reference work order C0086960); 11/13/88 (reference work order C0026199 & C0026200); 10/08/95 (reference C0165642). Local leak rate failures are defined as leak rates that exceed 9,000 cc/min in the reverse direction. No failures occurred in the forward direction of the check valve.

Component Performance History in Industry Databases:
Search was performed in the following databases: SOER/SER/SEN/O&MR; LER 1990 – present; LER 1984 – 1989; Nuclear Network Operating Experience; NRC; Plant Events (From Events Database). Search did not identify any adverse performance history.

In summary, check valve CHK-2(3)-11-16 has an excellent performance history.

(5) The licensee should provide a description of its inspection and testing program including standards, frequency, and acceptance criteria. The staff reviewer will use this information to evaluate the licensee's activities to monitor the component's performance at the facility. The information on the component would be reviewed by the appropriate technical review branch responsible for the component, as requested by the lead SPSB reviewer.

RESPONSE:

Component testing:

- SLC Injection Test, ST-O-011-400(5)-2(3), Standby Liquid Control System Loop Injection Test
  - Satisfies Peach Bottom Tech Spec. SR 3.1.7.9, "Ensures that there is a functioning flow path from the boron solution storage tank to the RPV..."
  - Confirm forward direction of check valve by verifying a flow rate of ≥ 43 gpm
  - Frequency = Once every 24 months

- Local Leak Rate in accordance with 10CFR50 Appendix J, ST 20.11.2
  - Satisfies Peach Bottom Tech Spec. SR 3.6.1.1.1, "Maintaining the primary containment OPERABLE requires compliance with the visual examinations and leakage rate test requirements of the Primary Containment Leakage Rate Testing Program."
  - Leakage must be less than or equal to 9000 cc/min
    Frequency = once every 916 days

(6) The licensee should also indicate potential compensating actions that could be taken within an acceptable time period to address the failure of the component. An example of a compensating action might be the ability to jumper a switch in the control room to overcome its failure. The staff reviewer will consider the availability of compensating actions and the likelihood of successful injection of the sodium pentaborate where non-redundant active components fail to perform their intended functions.

RESPONSE: In the unlikely event that a SLC injection path check valve fails to open, there are means of injecting Sodium Pentaborate utilizing two other systems (Reactor Water Cleanup or Control Rod Drive System) that are available for use currently for other accidents such as ATWS. Please note that, although potentially available for use, Peach Bottom is not taking credit for these alternate methods of injecting SLC for pH control. Peach Bottom believes compensating actions are not warranted due to the reliability of the check valves. These alternate methods are only mentioned here for completeness.

II. Check Valves CHK-2(3)-11-17

(1) The licensee should identify the non-redundant active components in the SLC system and provide their make, manufacturer, and model number. The staff reviewer will compare this information with performance data for the component from industry data bases and other sources.

RESPONSE:
Component: CHK-2(3)-11-17, " SLC DISCH HEADER TO RPV INBRD CHK DNSTRM PENE N-42"

Make: 1 1/2", MARK 952M3
Manufacturer: POWELL , WILLIAM CO - USE 461P
Model Number: 2349A-SWE FIG

(2) The licensee should provide the design-basis conditions for the component and the environmental and seismic conditions under which the component may be required to operate during a design-basis accident. Environmental conditions include design-basis pressure, temperature, relative humidity and radiation fields. The staff reviewer will compare the environmental and seismic conditions associated with the design-basis accident to the conditions for which the component was designed to determine whether the component is capable of performing its intended function.

Environmental Conditions:
Maximum Post LOCA Temperature = 340 degrees F
Maximum Pressure = 60.2 psia
Relative Humidity = 100%
180 day LOCA dose = 4.57×10^7 rads

Seismic Conditions:
Maximum Credible Earthquake

(3) The licensee should indicate whether the component was purchased in accordance with Appendix B to 10 CFR Part 50. If the component was not purchased in accordance with Appendix B, the licensee should provide information on the quality standards under which it was purchased. For the latter situation, information on the component would be reviewed by the appropriate technical review branch responsible for the component, as requested by the lead SPSB reviewer.

RESPONSE: Yes, the component was purchased IAW Appendix B to 10 CFR Part 50.

(4) The licensee should provide the performance history of the component both at the licensee's facility and in industry databases such as EPIX and NPRDS.

The staff reviewer will use this information to evaluate the reliability of the component relative to other components used in safety-related applications.

RESPONSE: Component History at Peach Bottom:
No failures identified in the forward or reverse direction.

Component Performance History in Industry Databases:
Search was performed in the following databases: SOER/SER/SEN/O&MR; LER 1990 – present; LER 1984 – 1989; Nuclear Network Operating Experience; NRC; Plant Events (From Events Database). Search did not identify any adverse performance history.

In summary, check valve CHK-2(3)-11-17 has an excellent performance history.

(5) The licensee should provide a description of its inspection and testing program including standards, frequency, and acceptance criteria. The staff reviewer will use this information to evaluate the licensee's activities to monitor the component's performance at the facility. The information on the component would be reviewed by the appropriate technical review branch responsible for the component, as requested by the lead SPSB reviewer.

RESPONSE:

<u>Component testing:</u>

- SLC Injection Test, ST-O-011-400(5)-2(3), Standby Liquid Control System Loop Injection Test
  - Satisfies Peach Bottom Tech Spec. SR 3.1.7.9, "Ensures that there is a functioning flow path from the boron solution storage tank to the RPV..."
  - Confirm forward direction of check valve by verifying a flow rate of ≥ 43 gpm
  - Frequency = Once every 24 months

- Local Leak Rate in accordance with 10CFR50 Appendix J, ST 20.11.2
  - Satisfies Peach Bottom Tech Spec. SR 3.6.1.1.1, "Maintaining the primary containment OPERABLE requires compliance with the visual examinations and leakage rate test requirements of the Primary Containment Leakage Rate Testing Program."
  - Leakage must be less than or equal to 9000 cc/min
  - Frequency = once every 916 days

(6) The licensee should also indicate potential compensating actions that could be taken within an acceptable time period to address the failure of the component. An example of a compensating action might be the ability to jumper a switch in the control room to overcome its failure. The staff reviewer will consider the availability of compensating actions and the likelihood of successful injection of the sodium pentaborate where non-redundant active components fail to perform their intended functions.

RESPONSE: In the unlikely event that a SLC injection path check valve fails to open, there are means of injecting Sodium Pentaborate utilizing two other systems (Reactor Water Cleanup or Control Rod Drive System) that are available for use currently for other accidents such as ATWS. Please note that, although potentially available for use, Peach Bottom is not taking credit for these alternate methods of injecting SLC for pH control. Peach Bottom believes compensating actions are not warranted due to the reliability of the check valves. These alternate methods are only mentioned here for completeness.

III. Remote Switch RMS-2(3)-11A-S001,

(1) The licensee should identify the non-redundant active components in the SLC system and provide their make, manufacturer, and model number. The staff reviewer will compare this information with performance data for the component from industry data bases and other sources.

RESPONSE:
Component: RMS-2(3)-11A-S001, Remote switch for the "A & B SLC Pumps"

Make: SB1 with Key Lock
Manufacturer: General Electric
Model Number: 225A4959P001

(2) The licensee should provide the design-basis conditions for the component and the environmental and seismic conditions under which the component may be required to operate during a design-basis accident. Environmental conditions include design-basis pressure, temperature, relative humidity and radiation fields. The staff reviewer will compare the environmental and seismic conditions associated with the design-basis accident to the conditions for which the component was designed to determine whether the component is capable of performing its intended function.

RESPONSE: Switches RMS-(2)3-11A-S001 are located in the Main Control Room and are subject to a mild environment.

(3) The licensee should indicate whether the component was purchased in accordance with Appendix B to 10 CFR Part 50. If the component was not purchased in accordance with Appendix B, the licensee should provide information on the quality standards under which it was purchased. For the latter situation, information on the component would be reviewed by the appropriate technical review branch responsible for the component, as requested by the lead SPSB reviewer.

RESPONSE: Yes, the component was purchased IAW Appendix B to 10 CFR Part 50.

(4) The licensee should provide the performance history of the component both at the licensee's facility and in industry databases such as EPIX and NPRDS.

The staff reviewer will use this information to evaluate the reliability of the component relative to other components used in safety-related applications.

RESPONSE: Component History at Peach Bottom:
RMS-3-11A-S001 key failed to lock in the "STOP" position (reference work order C0183323). The system remained operable in this condition.

Component Performance History in Industry Databases:
Search was performed in the following databases: SOER/SER/SEN/O&MR; LER 1990 – present; LER 1984 – 1989; Nuclear Network Operating Experience; NRC; Plant Events (From Events Database). Search did not identify any adverse performance history.

In summary, the remote switch RMS-2(3)-11A-S001 has an excellent performance history.

(5) The licensee should provide a description of its inspection and testing program including standards, frequency, and acceptance criteria. The staff reviewer will use this information to evaluate the licensee's activities to monitor the component's performance at the facility. The information on the component would be reviewed by the appropriate technical review branch responsible for the component, as requested by the lead SPSB reviewer.

RESPONSE: There is no inspection program currently in place for the control switch. However, this switch is functionally tested every refueling outage during the performance of surveillance test (ST-O-11-400(5)-2(3)) for the SLC system.

(6) The licensee should also indicate potential compensating actions that could be taken within an acceptable time period to address the failure of the component. An example of a compensating action might be the ability to jumper a switch in the control room to overcome its failure. The staff reviewer will consider the availability of compensating actions and the likelihood of successful injection of the sodium pentaborate where non-redundant active components fail to perform their intended functions.

RESPONSE: As stated above, the control switch's performance history has been excellent. Additionally, this component is readily accessible with the ability to jumper this switch from the control room within the required injection time. Finally, as discussed above, in the unlikely event that a SLC injection path check valve fails to open, there are means of injecting Sodium Pentaborate utilizing two other systems (Reactor Water Cleanup or Control Rod Drive System) that are available for use currently for other accidents such as ATWS. Please note that, although potentially available for use, Peach Bottom is not taking credit for these alternate methods of injecting SLC for pH control. Peach Bottom believes compensating actions are not warranted due to the reliability of the check valves. These alternate methods are only mentioned here for completeness.

ATTACHMENT 2

PEACH BOTTOM ATOMIC POWER STATION
UNITS 2 AND 3

Docket Nos. 50-277
50-278

License Nos. DPR-44
DPR-56

Supplement to License Amendment Request for
"PBAPS Alternative Source Term Implementation"

Clarification of Response to Question 10 from RAI dated January 16, 2004

The following response is provided as an update to Question 10 of a Request for Additional Information reply, dated March 15, 2004, regarding Peach Bottom's Alternative Source Term LAR submittal.

10. The proposed change to the Updated Final Safety Analysis Report (UFSAR) (Section 8 of the License Amendment Request (LAR)) states that the temperature profile presented in UFSAR Figure 14.6.12A includes a 2σ adder for decay heat. The figure is identified in the UFSAR as Revision 15 dated April 1998. During an amendment review in 2000, it was stated that the figure did not include this adder and additional information was provided to the staff to justify adequate conservatism in the minimum containment pressure available (MCPA) calculation without the adder at that time (Letter from B. C. Buckley, Sr., Nuclear Regulatory Commission (NRC), to J. A. Hutton, PECO Energy Company, August 14, 2000, "Peach Bottom Atomic Power Station, Units 2 and 3 Issuance of Amendment Regarding Crediting of Containment Overpressure for Net Positive Suction Head Calculations For Emergency Core Cooling Pumps (TAC Nos. MA629.1 and MA6292)."). Explain the discrepancy in these two statements. Has the analysis and figure been updated to include the adder and approved for use? If the figure does include this adder then why was this not identified during the amendment review in 2000?

    RESPONSE: The analyses provided during the amendment review in 2000 did not explicitly include a 2σ adder for decay heat, and additional information was provided to the staff to justify adequate conservatism elsewhere in the MCPA calculation without the adder. Subsequent to that review, it had been Exelon's intent to explicitly incorporate a 2σ adder for decay heat in future containment analyses. On May 24, 2001, GE issued SIL-636, and on June 6, 2001, SIL-636 revision 1, informing GE BWR owners of errors in the GE specific implementation of the ANSI/ANS 5.1-1979 decay heat standard. New decay heat values and uncertainties specific to PBAPS were regenerated using corrected GE procedures. Reanalysis of the containment response to a DBA-LOCA was performed by GE using their NRC approved SHEX computer code. This analysis included an explicit 2σ adder for decay heat. As described in the amendment review in 2000, it is this vendor containment analysis that was used as the basis for the revised utility generated MCPA calculation referred to in this submittal. With the explicit incorporation of the 2σ adder for decay heat, the additional justification of adequate conservatism in the MCPA calculation without the adder has been deleted. The UFSAR text relative to the suppression pool temperature response in Figure 14.6.12A, will be amended to reflect the new analysis, and that the UFSAR figure remains bounding.