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May 13, 2008

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

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: Response to Request for Supplemental Information Associated with Relief Request I4R-44

Reference:

1) Letter from P. B. Cowan (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Submittal of Relief Requests Associated with the Third and Fourth Inservice Inspection (ISI) Intervals and the First and Second Containment Inservice Inspection (CISI) Intervals," dated February 29, 2008

2) Letter from J. D. Hughey (U. S. Nuclear Regulatory Commission) to C. G. Pardee (Exelon Generation Company, LLC), "Peach Bottom Atomic Power Station, Units 2 and 3 – Request for Supplemental Information Regarding Relief Request I4R-44 (TAC NOS. MD8296 and MD8297)," dated May 7, 2008

In the Reference 1 letter, Exelon Generation Company, LLC (EGC) submitted for your review and approval relief requests associated with the third and fourth Inservice Inspection (ISI) intervals for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. Also included for your review and approval were relief requests associated with the first and second Containment Inservice Inspection (CISI) intervals for PBAPS, Units 2 and 3.

In a conversation with the U.S. Nuclear Regulatory Commission staff on April 29, 2008, supplemental information was requested as part of the acceptance review of Relief Request

I4R-44 concerning the risk-informed inservice inspection program at PBAPS, Units 2 and 3. A summary of this request is contained in the Reference 2 letter. Attached is our response to this request. There are no regulatory commitments contained in this letter.

Should you have any questions concerning this letter, please contact Tom Loomis at (610) 765-5510.

Respectfully,

DRH Pamela B. Cowan

Pamela B. Cowan
Director – Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Attachments: 1) U. S. NRC Request for Supplemental Information Concerning Relief Request I4R-44
2) Response to Request for Supplemental Information Concerning Relief Request I4R-44

cc: S. J. Collins, Regional Administrator, Region I, USNRC
F. Bower, USNRC Senior Resident Inspector, PBAPS
J. Hughey, Project Manager, USNRC
S. T. Gray, State of Maryland
R. R. Janati, Commonwealth of Pennsylvania

ATTACHMENT 1
U. S. NRC Request for Supplemental Information Concerning
Relief Request I4R-44

**REQUEST FOR SUPPLEMENTAL INFORMATION
REGARDING RELIEF REQUEST I4R-44
PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3
DOCKET NOS. 50-277 AND 50-278**

Question:

By letter to the Nuclear Regulatory Commission (NRC) dated February 29, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML08064058), Exelon Generation Company, LLC (the licensee), submitted a Request for Alternative I4R-44. The Request for Alternative I4R-44 proposes a risk-informed (RI) selection and examination program as an alternative to a portion of its current inservice inspection (ISI) program for Peach Bottom Atomic Power Station, Units 2 and 3, on the basis that the alternative provides an acceptable level of quality and safety. Exelon requests to implement an RI-ISI program based on the *Revised Risk-Informed Inservice Inspection Evaluation Procedure* (EPRI TR-112657, Revision B-A, December 1999).

NRC staff review of proposed RI-ISI programs is performed in accordance with Regulatory Guide (RG) 1.178, "An Approach for Plant-Specific Risk-Informed Decisionmaking for Inservice Inspection of Piping," Revision 1, September 2003 (ADAMS Accession No. ML032510128). RG 1.178 states that, when completed, Draft Guide DG-1122, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," will provide guidance on determining the quality of the probabilistic risk assessment (PRA) that is sufficient to provide confidence in the results such that they can be used in regulatory decision-making for light-water reactors. DG-1122 was issued as RG 1.200, Revision 1, in January 2005 (ADAMS Accession Nos. ML070240001 and ML071940235). As clarified in Regulatory Issue Summary 2007-06, "Regulatory Guide 1.200 Implementation," issued March 22, 2007 (ADAMS Accession No. ML070650428), the NRC staff will use Revision 1 of RG 1.200 to assess technical adequacy for all RI applications received after December 2007.

In order to make the application complete, the NRC requests that the licensee supplement the application to address the quality of the PRA utilized for Alternative Request I4R-44.

Response:

Supplemental information to address the quality of the PRA utilized for Relief Request I4R-44 is contained in Attachment 2.

ATTACHMENT 2
Response to Request for Supplemental Information Concerning
Relief Request I4R-44

Summary Statement of Peach Bottom Atomic Power Station, Units 2 and 3 PRA Model Capability for Use in Risk-Informed Licensing Actions

Introduction

Exelon Generation Company (EGC) employs a multi-faceted approach to establishing and maintaining the technical adequacy and plant fidelity of the PRA models for all operating EGC nuclear generation sites. This approach includes both a proceduralized PRA maintenance and update process, and the use of self-assessments and independent peer reviews. The following information describes this approach as it applies to the Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3 PRA.

PRA Maintenance and Update

The EGC risk management process ensures that the applicable PRA model remains an accurate reflection of the as-built and as-operated plants. This process is defined in the EGC Risk Management program, which consists of a governing procedure (ER-AA-600, "Risk Management") and subordinate implementation procedures. EGC procedure ER-AA-600-1015, "FPIE PRA Model Update" delineates the responsibilities and guidelines for updating the full power internal events PRA models at all operating EGC nuclear generation sites. The overall EGC Risk Management program, including ER-AA-600-1015, defines the process for implementing regularly scheduled and interim PRA model updates, for tracking issues identified as potentially affecting the PRA models (e.g., due to changes in the plant, errors or limitations identified in the model, industry operating experience), and for controlling the model and associated computer files. To ensure that the current PRA model remains an accurate reflection of the as-built, as-operated plants, the following activities are routinely performed:

- Design changes and procedure changes are reviewed for their impact on the PRA model.
- New engineering calculations and revisions to existing calculations are reviewed for their impact on the PRA model.
- Maintenance unavailabilities are captured, and their impact on CDF is trended.
- Plant specific initiating event frequencies, failure rates, and maintenance unavailabilities are updated approximately every four years.

In addition to these activities, EGC risk management procedures provide the guidance for particular risk management and PRA quality and maintenance activities. This guidance includes:

- Documentation of the PRA model, PRA products, and bases documents.
- The approach for controlling electronic storage of Risk Management (RM) products including PRA update information, PRA models, and PRA applications.

- Guidelines for updating the full power, internal events PRA models for EGC nuclear generation sites.
- Guidance for use of quantitative and qualitative risk models in support of the On-Line Work Control Process Program for risk evaluations for maintenance tasks (corrective maintenance, preventive maintenance, minor maintenance, surveillance tests and modifications) on systems, structures, and components (SSCs) within the scope of the Maintenance Rule (10CFR50.65 (a)(4)).

In accordance with this guidance, regularly scheduled PRA model updates nominally occur on an approximately 4-year cycle; longer intervals may be justified if it can be shown that the PRA continues to adequately represent the as-built, as-operated plant. EGC will be performing a regularly scheduled update to the PBAPS PRA model in 2009, which is expected to be approved by early 2010.

<u>PRA Self Assessment and Peer Review</u>

Several assessments of technical capability have been made, and continue to be planned, for the PBAPS, Units 2 and 3 PRA models. These assessments are as follows and further discussed in the paragraphs below.

- An independent PRA peer review was conducted under the auspices of the BWR Owners Group in 1998, following the Industry PRA Peer Review process [1]. This peer review included an assessment of the PRA model maintenance and update process.
- In 2004, a gap analysis was performed against the available version of the ASME PRA Standard [2] and the draft version of Regulatory Guide 1.200, DG-1122 [3]. In 2006, an assessment of the extent to which the previously defined gaps had been addressed was performed in conjunction with a PRA model update.
- During 2005 and 2006 the PBAPS, Units 2 and 3 PRA model results were evaluated in the BWR Owners Group PRA cross-comparisons study performed in support of implementation of the mitigating systems performance indicator (MSPI) process.
- As part of the PRA model update in 2009, the gap analysis will be updated to reflect pertinent changes to both the PRA Standard and Regulatory Guide 1.200.

A summary of the disposition of 1998 Industry PRA Peer Review facts and observations (F&Os) for the PBAPS, Units 2 and 3 PRA models was documented as part of the statement of PRA capability for MSPI in the PBAPS MSPI Basis Document [4]. As noted in that document, there were no significance level A F&Os from the peer review, and all significance level B F&Os were addressed and closed out with the completion of the current PB205 and PB305 models of record. Also noted in that submittal was the fact that, after allowing for plant-specific features, there are no MSPI cross-comparison outliers for PBAPS (refer to the third bulleted item above).

A Gap Analysis for the 2002 PBAPS, Units 2 and 3 PRA models (PB202 and PB302, respectively) was completed in January 2004. This Gap Analysis was performed against PRA Standard RA-S-2002 [2] and associated NRC comments in draft regulatory guide DG-1122 [3], the draft version of Regulatory Guide 1.200 Revision 0. This gap analysis defined a list of 83 supporting requirements from the Standard for which potential gaps to Capability Category II of the Standard were identified. For each such potential gap, a PRA updating requirements evaluation (URE- EGC model update tracking database) was documented for resolution.

A PRA model update was completed in 2006, resulting in the PB205C and PB305C updated models. In updating the PRA, changes were made to the PRA to address most of the identified gaps, as well as to address other open UREs. Following the update, an assessment of the status of the gap analysis relative to the new model and the updated requirements in Addendum B of the ASME PRA Standard concluded that 59 of the gaps were fully resolved (i.e., are no longer gaps), and another seven were partially resolved. Two additional gaps were identified during the performance of the review based on additional SRs that were added to Addendum B of the PRA standard [5] and NRC issued clarifications [6] after the 2004 gap analysis had been performed. A summary of the current open items including the partially resolved items is provided in attached Table 1.

Of the remaining gaps, those pertaining to the internal flooding analysis and LERF analysis will be addressed during the internal flooding and Level 2 model update that is ongoing in 2008. These analysis updates will be integrated into the Level 1 internal events model update that is scheduled to occur in 2009. The other remaining gaps will be reviewed for consideration during the 2009 model update process but are judged to have low impact on the PRA model or its ability to support a full range of PRA applications. The remaining gaps are documented in the URE database so that they can be tracked and their potential impacts accounted for in applications where appropriate.

<u>General Conclusion Regarding PRA Capability</u>

The PBAPS, Units 2 and 3 PRA maintenance and update processes and technical capability evaluations described above provide a robust basis for concluding that the PRA is suitable for use in risk-informed licensing actions. As specific risk-informed PRA applications are performed, remaining gaps to specific requirements in the PRA standard will be reviewed to determine which, if any, would merit application-specific sensitivity studies in the presentation of the application results.

<u>Assessment of PRA Capability Needed for Risk-Informed Inservice Inspection</u>

In the risk-informed inservice inspection (RI-ISI) program at PBAPS, the EPRI Risk-informed ISI methodology [7] is used to define alternative inservice inspection requirements. Plant-specific PRA-derived risk significance information is used during the RI-ISI plan development to support the consequence assessment, risk ranking, element selection and delta risk evaluation steps.

The importance of PRA consequence results, and therefore the scope of PRA technical capability, is tempered by three fundamental components of the EPRI methodology.

First, PRA consequence results are binned into one of three conditional core damage probability (CCDP) and conditional large early release probability (CLERP) ranges before any welds are chosen for RI-ISI inspection as illustrated below. Broad ranges are used to define these bins so that the impact of uncertainty is minimized and only substantial PRA changes would be expected to have an impact on the consequence ranking results.

Consequence Results Binning Groups		
Consequence Category	**CCDP Range**	**CLERP Range**
High	CCDP > 1E-4	CLERP > 1E-5
Medium	1E-6 < CCDP ≤ 1E-4	1E-7 < CLERP ≤ 1E-5
Low	CCDP ≤ 1E-6	CLERP ≤ 1E-7

The risk importance of a weld is therefore not tied directly to a specific PRA result. Instead, it depends only on the range in which the PRA result falls. As a consequence, any PRA modeling uncertainties would be mitigated by the wide binning provided in the methodology. Additionally, conservatism in the binning process (e.g., as would typically be introduced through PRA attributes meeting ASME PRA Standard Capability Category I versus II) will tend to result in a larger inspection population.

Secondly, the impacts of particular PRA consequence results are further dampened by the joint consideration of the weld failure potential via a non-PRA-dependent damage mechanism assessment. The results of the consequence assessment and the damage mechanism assessment are combined to determine the risk ranking of each pipe segment (and ultimately each element) according to the EPRI Risk Matrix. The Risk Matrix, which equally takes both assessments into consideration, is reproduced below.

POTENTIAL FOR PIPE RUPTURE PER DEGRADATION MECHANISM SCREENING CRITERIA	**CONSEQUENCES OF PIPE RUPTURE** IMPACTS ON CONDITIONAL CORE DAMAGE PROBABILITY AND LARGE EARLY RELEASE PROBABILITY			
	NONE	**LOW**	**MEDIUM**	**HIGH**
HIGH FLOW ACCELERATED CORROSION	**LOW Category 7**	**MEDIUM Category 5**	**HIGH Category 3**	**HIGH Category 1**
MEDIUM OTHER DEGRADATION MECHANISMS	**LOW Category 7**	**LOW Category 6**	**MEDIUM Category 5**	**HIGH Category 2**
LOW NO DEGRADATION MECHANISMS	**LOW Category 7**	**LOW Category 7**	**LOW Category 6**	**MEDIUM Category 4**

Thirdly, the EPRI RI-ISI methodology uses an absolute risk ranking approach. As such, conservatism in either the consequence assessment or the failure potential assessment will result in a larger inspection population rather than masking other important components. That is, providing more realism into the PRA model (e.g., by meeting higher capability categories) most likely would result in a smaller inspection population.

These three facets of the methodology reduce the importance and influence of PRA on the final list of candidate welds.

The limited manner of PRA involvement in the RI-ISI process is also reflected in the risk-informed license application guidance provided in Regulatory Guide 1.174 [8].

Section 2.2.6 of Regulatory Guide 1.174 provides the following insight into PRA capability requirements for this type of application:

> *There are, however, some applications that, because of the nature of the proposed change, have a limited impact on risk, and this is reflected in the impact on the elements of the risk model.*
>
> *An example is risk-informed inservice inspection (RI-ISI). In this application, risk significance was used as one criterion for selecting pipe segments to be periodically examined for cracking. During the staff review it became clear that a high level of emphasis on PRA technical acceptability was not necessary. Therefore, the staff review of plant-specific RI-ISI typically will include only a limited scope review of PRA technical acceptability.*

In addition to the above, it is noted that welds determined to be low risk significant are not eliminated from the ISI program on the basis of risk information. For example, the risk significance of a weld may fall from Medium Risk Ranking to Low Risk Ranking, resulting in it not being a candidate for inspection. However, it remains in the program, and if, in the future, the assessment of its ranking changes (either by damage mechanism or PRA risk) then it may again become a candidate for inspection. If it is discovered during the RI-ISI update process that a weld is now susceptible to flow-accelerated corrosion (FAC), inter-granular stress corrosion cracking (IGSCC), or microbiological induced cracking (MIC) in the absence of any other damage mechanism, then it is addressed in an "augmented" program where it is monitored for those special damage mechanisms. That occurs no matter what the Risk Ranking of the weld is determined to be.

Conclusion Regarding PRA Capability for Risk-Informed ISI

The PBAPS, Units 2 and 3 PRA models continue to be suitable for use in the risk-informed inservice inspection application. This conclusion is based on:

- the PRA maintenance and update processes in place,
- the PRA technical capability evaluations that have been performed and are being planned, and
- the RI-ISI process considerations, as noted above, that demonstrate the relatively limited sensitivity of the EPRI RI-ISI process to PRA attribute capability beyond ASME PRA Standard Capability Category I.

As the PRA analyses for the PBAPS, Units 2 and 3 10-year interval evaluation are performed during 2008 using the PB205 and PB305 PRA models, respectively, the remaining gaps to the PRA standard will be reviewed to determine which, if any, would merit RI-ISI-specific sensitivity studies in the presentation of the application results.

References

1. Boiling Water Reactors Owners' Group, *BWROG PSA Peer Review Certification Implementation Guidelines*, Revision 3, January 1997.
2. American Society of Mechanical Engineers, *Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications*, ASME RA-S-2002, New York, New York, April 2002.
3. U.S. Nuclear Regulatory Commission, *An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities*, Draft Regulatory Guide DG-1122, November 2002.
4. Peach Bottom MSPI Basis Document, Rev. 2, March 27, 2007.
5. American Society of Mechanical Engineers, Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications, ASME RA-Sb-2005, New York, New York, December 2005.

6. U.S. Nuclear Regulatory Commission Memorandum to Michael T. Lesar from Farouk Eltawila, "Notice of Clarification to Revision 1 of Regulatory Guide 1.200," for publication as a Federal Register Notice, July 27, 2007.
7. *Revised Risk-Informed Inservice Inspection Evaluation Procedure,* EPRI TR-112657, Revision B-A, December 1999.
8. U.S. Nuclear Regulatory Commission, *An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis*, Regulatory Guide 1.174, Revision 1, November 2002.

TABLE 1 – Status of Identified Gaps to Capability Category II of the ASME PRA Standard

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to RI-ISI
Gap #1	Update the Peach Bottom ISLOCA evaluation to be consistent with more recent Exelon evaluations.	IE-C12	Open – ISLOCA update has not yet been performed. However, the current ISLOCA values are reasonably conservative compared to other sites that have utilized the more detailed methodology.	Not significant given that the current approach is reasonably conservative.
Gap #2	Interview plant operations, maintenance, engineering, and safety analysis personnel for the purpose of identifying potential IEs that may have been overlooked. Alternatively, have such personnel review Section 2 of the Peach Bottom PRA IE Notebook and provide comments to this effect. Incorporate results of these interviews/reviews as an appendix to the IE Notebook or as a set of appropriate sentences (with references) to Section 2 of the IE Notebook.	IE-A6	Open – Although this would be an enhancement to the IE Notebook, it is not judged as a high priority. The current IE evaluation provides thorough documentation of the Initiating Events considered in the PBAPS model that is consistent with other BWRs. Note that Cat I for this SR does not require the performance of interviews for this purpose.	None. Category I is met and appropriate for this application.
Gap #6	Development of a Peach Bottom PRA Dependency Matrix Notebook such that it becomes the notebook describing the approach to treatment of all the various type of dependencies throughout the PRA should be considered. This can be accomplished by summarizing how all the various aspects of dependencies are treated and where the associated analyses for the dependencies (e.g., supporting walkdown information, room cooling assumptions, water supply duration, HRA, CCF) are documented.	SC-A4	Partially resolved - Although a specific dependency matrix notebook has not been prepared for Peach Bottom, each of the system notebooks includes a description of all dependencies and includes a detailed dependency matrix. Additionally, accident sequence dependencies as a function of initiating event category are discussed in the event tree notebook.	None. Dependencies are modeled. This is simply a baseline PRA model documentation consideration.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to RI-ISI
Gap #11	Provide descriptions of the limitations of thermal hydraulic analyses with respect to their use in the PRA (bases for success criteria, HRA timing, etc.) and ensure the application is within the limits of the code. Assessments of the capability limitations may be limited to the specific application of the calculation.	SC-C2	Open - Included in practice. MAAP was not utilized outside the bounds of known acceptability. Otherwise, awaiting guidance from EPRI and endorsement from NRC.	None. The model is not used beyond its known limitations. This is a documentation consideration only.
Gap #25	To meet the requirements of SR HR-A1 and HR-B1, the following would be developed as supporting documentation for PBAPS: - A list of the PRA systems to consider for test and maintenance actions - Rules for identifying and screening test and maintenance actions from the PRA - A list of procedures reviewed, the potential test and maintenance actions associated with the procedures, and the disposition of the action (screened or evaluated).	HR-A1 HR-B1	Open – Pre-initiator errors are included for some risk significant systems (i.e. HPCI, RCIC, LPCS, and SLCS) on a generic basis. The performance of a detailed process for identifying and screening test and maintenance pre-initiators is judged to have a minimal impact on the results of the model.	Not significant. Capability Category I is believed to be met for HR-B1. The pre-initiator assessment that exists is adequate for the RI-ISI application. Pre-initiator human actions do not contribute significantly to the risk significance results for this application.
Gap #26	To meet the requirements of SR HR-A2, the following would be developed as supporting documentation for PBAPS: - A list of the PRA systems to consider for mis-calibration actions - Rules for identifying and screening mis-calibration actions from the PRA - A list of procedures reviewed, the potential mis-calibration actions associated with the procedures, and the disposition of the action (screened or evaluated).	HR-A2	Partially Resolved - The process did not include a procedure review but did include a review of the need for transmitter/trip unit components to function properly, or where false signals could prematurely terminate the system function.	Not significant. The pre-initiator assessment that exists is adequate for the RI-ISI application, given the evaluation that has been performed and reflected in the model.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to RI-ISI
Gap #27	To meet the requirements of SR HR-A3, the following would be developed as supporting documentation for PBAPS: - A list of the PRA systems to consider for common cause mis-calibration actions - Rules for identifying and screening common cause mis-calibration actions from the PRA - A list of procedures reviewed, the potential common cause mis-calibration actions associated with the procedures, and the disposition of the action (screened or evaluated).	HR-A3	Partially Resolved - The process did not include a procedure review but did include a review of the need for transmitter/trip unit components to function properly, and common cause mis-calibrations were also included.	Not significant. The pre-initiator assessment that exists is adequate for the RI-ISI application, given the evaluation that has been performed and reflected in the model.
Gap #31	Establish the 'significant' pre-initiator HFEs based on the DG-1122 definition, and re-quantify the balance of the significant HFEs using the methodologies outlined in PB02AF-003.	HR-D2	Partially Resolved – Pre-initiators were included in the system models as described in the system notebooks that were created as part of the 2005 update. The process included a review of the need for transmitter/trip unit components to function properly, or where false signals could prematurely terminate the system function. However, not all significant pre-initiators were evaluated with a detailed HEP analysis. Rather, they were assigned a 'type' based on the transmitter it is associated with, and the types were assigned an HEP value based on the limited set of detailed pre-initiator evaluations that were performed as described in the HRA notebook.	None. The updated PRA model meets HR-D2 at Capability Category I, which is sufficient for the RI-ISI application.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to RI-ISI
Gap #54	Document and employ the methodology used for determining the standby component number of demands to include plant specific: a) surveillance tests, b) maintenance acts, c) surveillance tests or maintenance on other components, d) operational demands. Additional demands from post-maintenance testing should not be included.	DA-C6	Open - For the most part, the estimated demands were determined from the Maintenance Rule database, but a confirmation that it is collected exactly consistent with the DA-C6 requirements has not been performed. This is judged to have a minimal impact on the Bayesian updated reliability values utilized in the model.	Not significant. The model is reasonably consistent with data from the plant MR database, which is adequate for RI-ISI application.
Gap #55	To be consistent with SR DA-C8, the Peach Bottom PRA would need to be enhanced to include reviews of operating experience to determine the times that components were in standby.	DA-C8	Open – Note that Category I allows for estimates of standby status estimates as an acceptable approach.	None. Capability Category I is met, which is adequate for RI-ISI.
Gap #58	Ensure that the enhancements associated with DA-C4 include the guidance regarding the definition of maintenance hours that is provided in SR DA-C11 and that the counting of unavailability hours follows that definition.	DA-C11	Open - The maintenance rule data is used directly, but a confirmation that it collected exactly consistent with the DA-C11 requirements has not been performed. This is judged to have a minimal impact on the unavailability hours used in the model.	Not significant. The model is reasonably consistent with data from the plant MR database, which is adequate for RI-ISI application.
Gap #59	Ensure that the enhancements associated with DA-C4 include 1) the guidance regarding the treatment of maintenance hours vs. plant operational status that is provided in SR DA-C12 (and ensure that the counting of unavailability hours follows that definition); and 2) perform interviews of maintenance staff for equipment with incomplete or limited maintenance information.	DA-C12	Open - The maintenance rule data is used directly, but a confirmation that it collected exactly consistent with the DA-C11 requirements has not been performed. This is judged to have a minimal impact on the unavailability hours used in the model.	Not significant. The model is reasonably consistent with data from the plant MR database, which is adequate for RI-ISI application.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to RI-ISI
Gap #60	To be consistent with SR DA-C13, the PRA should include an examination of coincident outage times for redundant equipment (both intra- and inter-system) and incorporate the results into the modeling and documentation. However, it is judged that it is not practical to model all potential combinations of coincident maintenance unavailability values, and that a review of maintenance experience would not be sufficient to allow the prediction of the dominant risk contributor combinations. As such, the approach suggested is to identify dominant risk contributor combinations based on knowledge of the accident sequences modeling, and model such combinations of coincident maintenance outages in the fault tree logic. A review of recent maintenance experience would then be performed to identify events of coincident maintenance outages for these combinations to support probability estimation for the events.	DA-C13	Partially resolved - Model includes coincident outage times for a few pertinent combinations (e.g. HPCI/RCIC, RHR Loops), but since no known overlap existed for these combinations, an arbitrarily small value (1.0E-5) was assigned. It is judged that the incorporation of coincident maintenance terms will have a minimal impact on the results of the model.	Not significant. The model is reasonably consistent with known plant operating practice and experience. An exhaustive assessment is not needed to support use of the PRA for RI-ISI application.
Gap #65	During the plant specific data update, ensure the data used reflects the current design and operating conditions. Include guidance in the documentation related to updating data when changes are made to equipment or operating conditions.	DA-D7	Partially resolved - The Component Data Notebook includes development of the updated plant-specific data evaluation. Specific guidance on updating data when changes are made is not provided, but providing these definitions should not have an impact on the quantitative results from the PRA model.	None. The process used is appropriate. This is a documentation issue only.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to RI-ISI
Gap #67	The Peach Bottom PRA appropriately includes a number of internal flood initiators and associated event trees (refer to Section 9 of the main documentation). The internal flooding analysis needs to be expanded into a single comprehensive analysis, and updated where appropriate. Flooding documentation needs to be upgraded especially for walkdowns and descriptions of calculations supporting the quantitative analysis.	IF-F*	Open – Internal Flood analysis being updated in 2008.	Not applicable. In the PBAPS RI-ISI process, the internal flooding PRA model was not directly used to support the development of the ISI program, and no modifications to the internal flooding portion of the PRA model are made in conducting the analysis.
Gap #68	Identify the PRA modeled SSCs in flood areas per requirements of IF-A2 and IF-A3.	IF-A*	Open – Internal Flood analysis being updated in 2008.	Not applicable. See Gap #67.
Gap #69	Identify and document potential flood sources for areas that do not screen out per the requirements in IF-B1, B2, B3, and B4.	IF-B*	Open – Internal Flood analysis being updated in 2008.	Not applicable. See Gap #67.
Gap #70	Identify and document scenarios, propagation paths, and affected SSCs per the requirements in IF-C1, C2, C3, and C4.	IF-C*	Open – Internal Flood analysis being updated in 2008.	Not applicable. See Gap #67.
Gap #71	Identify human actions for flood mitigation and incorporate into model per IF-C6 standards	IF-C6	Open – Internal Flood analysis being updated in 2008.	Not applicable. See Gap #67.
Gap #72	Review and update flood frequencies per IF-D2, D3, D4, and D5.	IF-D*	Open – Internal Flood analysis being updated in 2008.	Not applicable. See Gap #67.
Gap #73	Review and develop flood sequences per the requirements of IF-E1, E2, E3, E4, E5, and E6.	IF-E*	Open – Internal Flood analysis being updated in 2008.	Not applicable. See Gap #67.
Gap #77	The uncertainty analysis could be further enhanced by providing a discussion of the guidelines used to review results and identify important contributors to uncertainty. Use of a systematic process of identifying these areas and evaluating them may improve the overall quality of the analysis.	QU-E2	Partially resolved – Sensitivity studies included as part of the evaluation in Section 4.5 of the PB PRA Summary Notebook, but the choice of sensitivities could be judged as not a systematic process. However, the QU-E2 SR definition has since changed – refer to Add #2 below.	See Add #2.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to RI-ISI
Gap #80	Include an assessment of the significance of assumptions on the quantitative results.	QU-F4	Open - Identification of key assumptions will be application specific. Also, the QU-F4 SR has been redefined.	See Add #2.
Gap #83	Strict reading of LE-E4 would indicate that the following enhancements to the LERF analysis and associated documentation would need to be made to comply with the Standard: - Explicitly assess dependencies among Level 2 HEPs (and combinations of Level 2 HEPs with Level 1 HEPs) - Perform quantitative sensitivity studies of the LERF analysis- Perform quantitative uncertainty assessment of the LERF analysis.	LE-E4	Open - Level 2 Analysis is being updated in 2008.	LERF results from the updated model will need to be examined to determine if the RI-ISI update would be significantly impacted.
Add #1	Addendum B of the ASME PRA Standard [5] added SRs to document the quantitative definition used for significant basic event, significant cutset, significant accident sequence, and significant accident progression sequence in the CDF and LERF analysis.	QU-F6 LE-G6	Open – These new SRs will be addressed during the next full PRA model update, but providing these definitions should not have an impact on the quantitative results from the PRA model.	None. This is a documentation issue. The model is not being changed to address this item.
Add #2	Several SRs associated with treatment of model uncertainty and related model assumptions have been recently redefined. NRC has issued [6] a clarification to its endorsement of the PRA Standard. NRC and EPRI are currently preparing guidance on an acceptable process for meeting these requirements.	QU-E1 QU-E2 QU-E4 QU-F4 IE-D3 AS-C3 SC-C3 SY-C3 HR-I3 DA-E3 IF-F3 LE-G4	Open – These recently redefined SRs will be addressed during the next full PRA model update after the NRC and EPRI guidance becomes available.	To be determined once the new NRC/EPRI guidance is available. However, the EPRI RI-ISI process is defined such that model uncertainties will not unduly influence results.