Provide to John Fair on 11/15/02

Exelon

FAX

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Please pass this to John Fair for review. We will support a discussion, if necessary.

Confirmatory Item 4.3.2-1

With the applicant's commitment to include in the UFSAR Supplement a description of the corrective actions to address closure studs as provided above in the response to RAI 4.3-1; and perform plant specific calculations for the locations identified in NUREG/CR-6260 for an older vintage BWR plant considering applicable environmental factors provided in NUREG/CR-6583 and NUREG/CR-5704 as provided above in response to RAI RAI 4.3-6; the staff concludes that the UFSAR Supplement will include and appropriate summary description of the programs and activities to manage aging as required by 10 CFR 54.21(d). The applicant needs to provide the revised UFSAR Supplement that includes these commitments. This is Confirmatory Item 4.3.2-1.

Response:

The UFSAR Supplement has been revised to add a description of the corrective actions to address closure studs and perform plant specific calculations for the locations identified in NUREG/CR-6260 for an older vintage BWR plant considering applicable environmental factors provided in NUREG/CR-6583 and NUREG/CR-5704 as shown below.

A.5.2.1 Reactor Vessel Fatigue

Unit 2 and Unit 3 reactor vessel fatigue analyses depend on cycle count assumptions that assume a 40-year operating period. The effects of fatigue in the reactor vessel will be managed for the period of extended operation by the fatigue management program for cycle counting and fatigue usage factor tracking as described in Section A.4.2.

This aging management program will ensure that fatigue effects in vessel pressure boundary components will be adequately managed and will be maintained within code design limits for the period of extended operation, in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

The fatigue evaluation of RPV closure studs is based on very conservative analysis techniques, that, in turn leads to a CUF that could exceed 1.0 during the period of extended operation.

The closure studs will be monitored by the fatigue management cycle counting and fatigue usage factor tracking program described in Section A.4.2. As soon as the CUF value approaches 1.0, the following corrective actions will be triggered:

- **Refinement of the fatigue analysis to lower the CUF to below 1.0 or**
- **Repair/replacement of the studs or**
- **Manage the effects of fatigue by an inspection program, which will be provided to the NRC for staff review and approval prior to implementation.**

A.5.2.4 Effects of Reactor Coolant Environment on Fatigue Life of Components and Piping (Generic Safety Issue 190)

Generic Safety Issue (GSI) 190 was identified by the NRC because of concerns about potential effects of reactor water environments on component fatigue life during the period of extended operation. The GSI was closed in December 1999 because the NRC concluded that environmental effects have a negligible effect on core damage frequency; however, license renewal applicants need to address the effects of the coolant environment on component fatigue life.

To evaluate the impact of reactor water environment on the fatigue life of components, plant-specific calculations will be performed for the locations identified in NUREG/CR-6260 for the older vintage BWR plant. For each of these locations, detailed environmental fatigue calculations will be performed using the appropriate F_{en} relationships from NUREG/CR-6583 (for carbon/low alloy steels) and NUREG/CR-6704 (for stainless steels), as appropriate for the material for each location. The detailed calculations will include calculation of an appropriate F_{en} factor for each individual load pair in the governing fatigue calculation so that an overall multiplier on CUF for environmental effects can be determined for each location. These calculations will be performed prior to entry into the period of extended operation, and appropriate corrective action will be taken if the resulting CUF values exceed 1.0.

Exelon reserves the right to modify this position in the future based on the results of industry activities currently underway, as well as based on the results of any other methodology improvements that may be made associated with environmental fatigue. It is understood that any such modifications will be subject to NRC approval prior to implementation at PBAPS.

Provided to John Fair on 11/15/02

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Confirmatory Item 4.1.3-1

The applicant indicated that it did not expect the number of design transients assumed in these CUF calculations to be exceeded during the period of extended operation. Therefore, the Peach Bottom pipe break postulations remain valid for the period of extended operation in accordance with the requirements of 10 CFR 54.21(c)(1). The staff finds that the applicant's response is acceptable because the existing calculations are bounding for the period of extended operation. The staff concludes that the applicant has adequately evaluated the TLAA related to pipe breaks as required by 10 CFR 54.21(c). The UFSAR update needs to include a summary of the activities for the evaluation of this TLAA. **This is Confirmatory Item 4.1.3-1.**

Response:

UFSAR Section A.10.3.3 indicates that for recirculation system piping, breaks have been assumed to occur at intermediate locations where the cumulative usage factor (CUF) exceeds 0.1.

This piping has been re-analyzed to consider the extended period of operation and using the same screening criteria of 0.1, no new breaks were identified. Furthermore, RPV recirculation inlet and outlet nozzle and RHR system tee connections to the recirculation line are included in the fatigue management program and fatigue usage tracking as described in Section A.4.2 of the UFSAR Supplement as shown below.

A.4.2 Fatigue Management Activities

The fatigue management program counts fatigue stress cycles and tracks fatigue usage factors. The program will be enhanced to broaden its scope and update implementation methods, and will consist of analytical methods to determine stress cycles and fatigue usage factors from operating cycles, automated counting of fatigue stress cycles, and automated calculation and tracking of fatigue cumulative usage factors (CUFs). The program will calculate and track CUFs for bounding locations in the reactor pressure vessel (RPV), RPV internals, Group I piping, and containment torus. The fatigue management program enhancements will be implemented prior to the end of the initial operating license term for PBAPS.

Provided to Barry E. on 11/15/02

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Please pass these to Barry Elliot for review. We will support a conference call, if necessary.

Confirmatory Item 4.2.1.2-1

The UFSAR Supplement needs to include the additional information contained in the applicant's response to RAI 4.2-3 regarding the evaluation of this TLAA. This is Confirmatory Item 4.2.1.2-1.

Response:

The UFSAR Supplement has been revised to add a summary description of Charpy Upper Shelf Energy as shown below.

A.5.1.1 Reactor Vessel Neutron Embrittlement

The reactor vessel materials are subject to embrittlement, primarily due to exposure from neutron radiation. Calculations for end-of-life fluence for a 60-year licensed operating period (54 EFPYs) using the GE fluence calculation methodology (NEDC-32983P, "General Electric Methodology for Reactor Pressure Vessel Fast Neutron Flux Evaluation") were performed. NEDC-32983P was approved by the NRC in a letter dated September 14, 2001, from S.A. Richards (NRC) to J.F. Klapproth (GE). For Units 2 and 3, the 54 EFPYs RPV peak fluence predictions are 2.2×10^{18} n/cm^2 at the inner vessel wall and 1.6×10^{18} n/cm^2 at 1/4T location. Analyses have been performed that use these fluence results to address the following:

- Upper Shelf Energy
- P-T Limit Curves
- Reactor Vessel Circumferential Weld Examination Relief
- Reactor Vessel Axial Weld Failure Probability

A.5.1.1.1 Upper Shelf Energy (USE)

Section IV.A.1a of Appendix G to 10 CFR Part 50 requires, in part, that the RPV beltline materials have Charpy USE in the transverse direction for base metal and along the weld for weld material of no less than 50 ft-lb (68J), unless it is demonstrated in a manner approved by the Director, Office of Nuclear Reactor Regulation, that lower values of Charpy USE will ensure margins of safety against fracture equivalent to those required by Appendix G of Section XI of the ASME Code.

By letter dated April 30, 1993, the Boiling Water Reactor Owners Group (BWROG) submitted a topical report entitled "10 CFR Part 50 Appendix G Equivalent Margins Analysis for Low Upper Shelf Energy in BWR/2 Through BWR/6 Vessels," to demonstrate that BWR RPVs could meet margins of safety against fracture equivalent to those required by Appendix G of the ASME Code Section XI for Charpy USE values less than 50 ft-lb. In a letter dated December 8, 1993, the staff concluded that the topical report demonstrates that the evaluated materials have the margins of safety against fracture equivalent to Appendix G of ASME Code Section XI, in accordance with Appendix G of 10 CFR Part 50. The BWROG analysis determined that the minimum allowable Charpy USE in the transverse direction for base metal and along the weld for weld metal was 35 ft-lb.

General Electric (GE) performed an update to the USE equivalent margins analysis, which is documented in EPRI TR-113596, "BWR Vessel and Internals Project BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines," BWRVIP-74, September 1999. The staff review and approval of EPRI TR-113596 is documented in a letter from C. I. Grimes to C. Terry dated October 18, 2001. The analysis in EPRI TR-113596 determined the reduction in the unirradiated Charpy USE resulting from neutron radiation using the methodology in RG 1.99, Revision 2. EPRI TR-113596 indicates that the percent reduction in Charpy USE for the limiting BWR/3-6 beltline plates and BWR non-Linde 80 submerged arc welds are 23.5% and 39%, respectively. For PBAPS, the predicted percent decrease of the beltline material USE values at 1/4T and 54 EFPYs was estimated using BWRVIP-74 and RG 1.99, Revision 2. The predicted percent decrease in USE for the limiting beltline plate material at the end of the license renewal period is 14% for Unit 2 and 16% for Unit 3; both predicted values of USE are less than the generic value of 23.5% reported in EPRI TR-113596. Similarly, the RG 1.99, Revision 2, predicted percent decrease in USE for limiting weld material (non-Linde 80 weld material at both units) at the end of license renewal period is 21% for both Unit 2 and Unit 3, which is less than the generic value of 39% reported in EPRI TR-113596. Therefore, the Charpy USE values at 54 EFPYs for the limiting plate and weld materials at Units 2 and 3 are greater than the minimum allowable value of 35 ft-lb, which demonstrates that the evaluated materials have the margins of safety against fracture equivalent to Appendix G of Section XI of the ASME Code, in accordance with Appendix G of 10 CFR Part 50, throughout the license renewal period.

Confirmatory Item 4.2.3.2-1

The UFSAR Supplement needs to include the additional information contained in the applicant's response to RAI 4.2-6 regarding the evaluation of this TLAA. This is Confirmatory Item 4.2.3.2-1.

Response:

The UFSAR Supplement has been revised to add a summary description of reactor vessel circumferential weld examination relief as shown below.

A.5.1.1.3 Reactor Vessel Circumferential Weld Examination Relief

Relief has been granted from the requirements for inspection of RPV circumferential welds for the remainder of the current 40-year licensed operating period. The justification for relief is consistent with Boiling Water Reactor Vessel and Internals Program BWRVIP-05 guidelines. Application for an extension of this relief for the 60-year period of extended operation will be submitted prior to the end of the initial operating license term by demonstrating that (1) at the expiration of the license, the circumferential welds satisfy the limiting conditional failure probability for circumferential welds in the BWRVIP-05 evaluation, and (2) the applicants have implemented operator training and established procedures that limit the frequency of cold over-pressure events to the frequency specified in the BWRVIP-05 report.

The NRC staff used the mean RT_{NDT} value for materials to evaluate failure probability of BWR circumferential welds at 32 and 64 EFPY in the SER on BWRVIP-05 dated July 28, 1998. For PBAPS, the 54 EFPY mean RT_{NDT} values were determined to be 12 °F and 17 °F for Units 2 and 3, respectively. For Unit 2, the 54 EFPY fluence is 1.8E18 n/cm^2, and Cu and Ni contents are 0.056 and 0.96 wt%, respectively. For Unit 3, the 54 EFPYs fluence is 1.4E18 n/cm^2, and Cu and Ni contents are 0.102 and 0.942 wt%. These 54 EFPY values confirm that RT_{NDT} values for Units 2 and 3 are bounded by the 64 EFPYs mean RT_{NDT} value of 70.6 °F used by NRC for determining the conditional failure probability of a circumferential girth weld.

The procedures and training that will be used to limit the frequency of cold over-pressure events to the number specified in the BWRVIP-05 SER for the RPV circumferential weld relief request extension, during the license renewal term, are the same as those approved for use in the current period which used the BWRVIP-05 technical alternative for the current term.

The analyses associated with reactor vessel circumferential weld examination relief ~~will~~ was ~~be~~ projected to the end of the period of extended operation, in accordance with the requirements of 10 CFR 54.21(c)(1)(ii).

From: B. Elliot

Confirmatory Item 4.2.4.2-1

The UFSAR Supplement needs to include the additional information contained in the applicant's response to RAI 4.2-7 regarding the evaluation of this TLAA. This is Confirmatory Item 4.2.4.2-1.

Response:

The UFSAR Supplement has been revised to add a summary description of reactor vessel axial weld examination relief as shown below.

A.5.1.1.4 Reactor Vessel Axial Weld Failure Probability

BWRVIP-05 estimated the 40-year end-of-life failure probability of a limiting reactor vessel axial weld, showed that it was orders of magnitude greater than the 40-year end-of-life circumferential weld failure probability, and used this analysis to justify relief from inspection of the circumferential welds, as noted above.

The re-evaluation of the axial weld failure probability for 60 years depends on vessel ΔRT_{NDT} calculations. The NRC used Mean RT_{NDT} for the comparison. The mean RT_{NDT} values used by the NRC was determined using the neutron fluence at the clad/weld (inner) interface, and did not include a margin term. A comparison of the Mean RT_{NDT} values from the NRC report with PBAPS data shows that the NRC analysis bounds the PBAPS welds. The mean RT_{NDT} for PBAPS Units 2 and 3 is $11^{0}F$ compared to the bounding plant mean RT_{NDT} value of $91^{0}F$. Although a conditional failure probability was not calculated, the fact that the PBAPS 54 EFPY value is less than the value the staff used leads to the conclusion that PBAPS is bounded by the NRC analysis.

The analysis associated

A copy of the Fax provided to Barry E. & Renee on 11/14/02

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Please share these with Barry Elliot and Renee Li so that the items can be closed. We will be pleased to support a conference call, if necessary.

Confirmatory Item 4.1.2-1:

In a separate licensing action, the applicant has submitted a license amendment for a power uprate to increase the maximum allowed operating power level. This power uprate is based on the increased accuracy of feedwater flow monitors. The higher power level may result in higher reactor coolant temperatures, increased reactor coolant flow, and/or increased neutron fluence. On July 23, 2002, the staff held a conference call with the applicant to ask if the effects of the power uprate were considered during its evaluation of the TLAAs or that the analysis results are bounding for the higher power level. The applicant stated that the effects of the power uprate were considered. This is Confirmatory Item 4.1.2-1.

Response:

As part of the power uprate effort due to increased accuracy of feedwater flow monitors, a separate RPV fracture toughness evaluation was performed. This evaluation confirmed that the fluence, adjusted reference temperature (ART), and the Upper Shelf Energy (USE) at the end of license renewal period are bounded by the values provided in RAIs 4.2-1 and 4.2-3 for the PBAPS license renewal application.

Furthermore, no additional aging effects that require management are applicable due to the small increase in steam flow.

Confirmatory Item 4.1.3-2

By letter dated February 6, 2002, the staff requested additional information, per RAI 3.3-3, as to why the crane load cycle limit was not included as an TLAA. The applicant responded in a letter dated May, 6, 2002, in which it stated that it will update the UFSAR Supplement to include load cycles for the reactor building overhead bridge cranes, turbine hall cranes, emergency diesel generator bridges, and circulating water pump structure gantry crane as a TLAA in Section 4.7.4 of the LRA. In the response, the applicant stated that the cranes are predominantly used to lift loads which are significantly lower than the crane's rated load capacity. For example, the reactor building cranes will undergo less than 5000 load cycles in 60 years based on the projected number of lifts during refueling outages, handling of spent fuel storage casks, and testing. The other cranes are expected to experience significantly fewer load cycles than the reactor building cranes. Thus, the number of lifts at or near their rated load is low compared to the design limit of 20,000 load cycles. The applicant stated that the load cycles for these cranes were evaluated for the period of extended operation and it was determined that the analyses associated with crane design, including the load cycle limit, remain valid for the period of extended operation and, therefore, meet the requirements of 10 CFR 54.21(c)(1)(i). The staff agrees with the applicant's conclusion that the cranes will continue to perform their intended function throughout the period of extended operation as required by 10 CFR 54.21 (c)(1) and finds the applicant's response acceptable. The update of the UFSAR Supplement is as required by 10 CFR 54.21(c)(1) is **Confirmatory Item 4.1.3-2.**

Response:

The UFSAR Supplement has been revised to add crane load cycle limit as a TLAA as shown below.

A.5.7 Crane Load Cycle Limit

The following cranes have load cycle assumptions that result in the fatigue analyses, considered by NRC staff a TLAA:

- Reactor building overhead bridge cranes
- Turbine hall cranes
- Emergency diesel generator bridge cranes
- Circulating water pump structure gantry crane

The load cycles for these cranes were evaluated for the period of extended operation. For each crane, the actual usage over its projected life through the period of extended operation will be less than the analyzed number of cycles. The cranes will continue to perform their intended function throughout the period of extended operation.

Therefore, the analysis associated with load cycle limit for the cranes, remains valid for the period extended operation in accordance with 10CFR54.21(c)(1)(i).

PK per Rene 11/20/02

Provided a copy for the Fax to Meena Khanna on 11/13/02

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Please share this information as to why one-time inspection is not required. We can support a conference call, if required.

Open Item 3.0.3.6.2-1

In response to RAIs B.1.8-1 and B.1.8-2, the applicant stated that the ISI program is not credited with managing the aging effects of ASME Code class piping in several plant systems, including HPCI, core spray, PCIS, RCIC, and RHR. Instead, the applicant stated the aging was adequately managed by Reactor Coolant System Chemistry (B.1.2), Condensate Storage Tank Chemistry Activities (B.1.4), Closed Cooling Water Chemistry (B.1.3), or Torus Water Chemistry Activities (B.1.5), as applicable. These programs provides chemistry controls only and do not include provisions for any inspections to verify the effectiveness of the programs. Water chemistry programs are designed to mitigate aging effects and not designed to confirm that the aging effect has not occurred. Confirmation of the effectiveness of chemistry programs is needed because they may not be effective in managing aging effect particularly in low or stagnant flow areas and lead to unacceptable degradation. Therefore, it is the staff=s position that the applicant should perform inspections, through either the ISI program or one-time inspections, which are credited for license renewal, to verify the effectiveness of the chemistry program credited for managing the effects of aging.

Open Item 3.0.3.6.2-1 response:

In order to verify the effectiveness of the chemistry program, inspections performed as part of the ISI Program for ASME Class 2 piping in the HPCI, RCIC, RHR, and Core Spray systems will be credited for PBAPS license renewal aging management. PCIS (RWCU) is not included here because it is ASME Class 1 piping and is already committed in the ISI program in the LRA. The ISI Program description, B.1.8, has been revised to incorporate this activity and is attached to Open Item 3.1.3.2.1-1.
The Fuel Pool Cooling system will be included in the scope of the One-Time Piping Inspection activities to verify the effectiveness of the Fuel Pool Chemistry activities. This is because the Fuel Pool Cooling system is not in the scope of the ISI Program.

For Closed Cooling Water Chemistry, the PBAPS procedures are based on EPRI TR-107396, "Closed Cooling Water Chemistry Guidelines". This guideline includes Section 5 on Performance Monitoring which describes several tools that may be used to determine the effectiveness of the treatment program. Of the four tools listed, PBAPS uses three of them to monitor effectiveness. The three tools used are Chemical treatment and impurity measurements, corrosion control measurements, and microbiological measurements. The concentration of specific impurities in the CCW system (for example, chloride, fluoride or sulfate) could have an impact on specific components in the system. The concentration of other impurities (for example, iron and copper) are indirect indicators of corrosion in the CCW system. Microbiological measurements ensure that biological growth will not impact heat transfer and corrosion. The fourth tool, non-chemistry monitoring inspections are not used at PBAPS because the combination of the three tools ensures that the effectiveness of the chemical treatment program. In addition, the operating experience both at PBAPS and in the industry has been good for CCW systems where the chemical parameters are controlled and monitored.
In conclusion, the effectiveness of the chemical treatment program is monitored in accordance with the EPRI guideline without the need for inspections.

11/8 Gave to Cliff & Stu

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CI 3.0.3.11.2-1
Please share ~~this~~ with Cliff Munson to ensure this meets his expectations.

Please share CI 3.0.3.14.3-1 with Stewart Bailey to ensure that this meets his expectations.

CI 3.0.3.11.2-1

A.1.16 Maintenance Rule Structural Monitoring Program

The maintenance rule structural monitoring program is that portion of the PBAPS structural monitoring program that is being credited for license renewal. The maintenance rule structural monitoring program complies with 10CFR50.65 and utilizes visual inspections in managing aging effects for concrete and grout in accessible areas, masonry block walls, carbon steel structures and components, and hazard barrier seals within the scope of license renewal that are not covered by other existing inspection programs. Concrete and masonry block walls are monitored for loss of material, cracking, and change in material properties. Grout is monitored for cracking and carbon steel structures and components are monitored for loss of material, due to corrosion. Hazard barrier penetration seals and expansion joints are monitored for change in material properties, delamination and separation, and cracking. Maintenance rule structural monitoring program activities provide reasonable assurance that aging effects are detected and addressed prior to loss of intended function.

CI 3.0.3.14.3-1

A.2.6 Door Inspection Activities

The door inspection activities provide for managing the aging effects for hazard barrier doors that are exposed to the outdoor **and sheltered** environments. The aging management review determined that the activities will be enhanced to include additional doors. In addition, the activities will be enhanced to include inspection for loss of material, **due to corrosion,** in hazard barrier doors. The door inspection activities also provide for managing the aging effects for gaskets associated with water-tight hazard barrier doors in both outdoor and sheltered environments. The inspection activities consist of condition monitoring of the gaskets associated with water-tight hazard barrier doors on a periodic basis. The hazard barrier doors inspection activities are condition monitoring activities that utilize inspections to provide reasonable assurance that aging effects will be detected and addressed prior to loss of intended function. Activity enhancements will be implemented prior to the end of the initial operating license term for PBAPS.

11/7/02 Gave to Duc

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Please pass along to Duc Nguyen for his confirmation.

3.6.1.2.1-1 The staff acknowledges that the EPR-insulated replacement cable is more resistant to water-treeing. However, the staff still does not accept the applicant's positions that moisture is not an aging effect requiring aging management for these cables. The staff believes that the discussion and conclusion of the paper, "Assessment of Field Aged 15kV and 35kV Ethylene Propylene Rubber Insulated Cables", do not support the applicant's position that moisture is not an aging effect requiring management at PBAPS. For example, the paper concludes that aging of the EPR-insulated cables can be characterized by an increase in moisture content, growth of water trees, drop in insulation elongation, increase in dissipation factor, and decrease in AC and impulse voltage breakdown strength. Further, the data for water trees, elongation, dissipation factor, and AC and impulse strength indicate that EPR insulated cable deterioration appears to result from moisture permeating the insulation of the cable. Therefore, the applicant has not provided a sufficient technical justification for not requiring an aging management program for inaccessible medium-voltage cables and has not proposed to prevent such cables from being exposed to significant moisture, such as inspecting for water collection in cable manholes and conduit and draining water, as needed. **This is part of Open Item 3.6.1.2.1-1.** The additional part of this open item is discussed in Section 3.6.3.2.1 of this SER.

(From Section 3.6.3.2.1 of this SER) However, as discussed in Section 3.6.1.2.1, the staff does not accept the applicant's position that moisture is not an aging effect requiring an aging management for these cables. The staff is concerned that the applicant has not provided a sufficient technical justification for not requiring an aging management program for buried cables, not specifically designed for a wet environment. **This is the other part of Open Item 3.6.1.2.1-1.**

Response to Open Item 3.6.1.2.1-1

The applicant believes the EPR replacement cable is designed for wet environments, is highly resistant to water treeing, and has an operating life in excess of 30 years. The replacement program commenced in 1995 and was completed in 1999. Although the applicant disagrees with the conclusions of the staff as stated above, the applicant will commit to the following activity for in-scope, inaccessible medium voltage cables not subject to 10CFR50.49 environmental qualification requirements. This program is similar to the GALL program, XI.E3.

B.3.5 INACCESSIBLE MEDIUM-VOLTAGE CABLES NOT SUBJECT TO 10CFR50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

ACTIVITY DESCRIPTION

The purpose of the aging management activity is to provide reasonable assurance that the intended functions of inaccessible medium-voltage cables that are not subject to the environmental qualification requirements of 10CFR50.49 and are exposed to adverse

localized environments caused by significant moisture coincident with significant voltage will be maintained consistent with the current licensing basis through the period of extended operation. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service environment for the cable. An adverse variation in environment is significant if it could appreciably increase the rate of aging of a component or have an immediate adverse effect on operability. This activity considers the technical information and guidance provided in NUREG/CR- In this aging management activity there is no preventive action taken. In a long cable 5643, IEEE Std. P1205, SAND96-0344, and EPRI TR-109619.
run in a conduit, duct bank, or direct buried, most of the length is inaccessible for inspection to determine if it is exposed to significant moisture. Significant moisture is assumed to be present unless engineering data indicates otherwise. If any portion of a medium-voltage cable along its entire run is inaccessible and could be subject to significant moisture exposure, that cable would be identified as inaccessible and included in the sample population subject to testing per this activity.

Evaluation and Technical Basis

1. ***Scope of Program:*** This activity applies to inaccessible (e.g., in conduit, duct bank, or direct buried) medium-voltage cables within the scope of license renewal (including the 34.5kV SBO Alternate AC source) that are exposed to significant moisture simultaneously with significant voltage. Significant moisture is defined as periodic exposures to moisture that last more than a few days (e.g., cable in standing water). Periodic exposures to moisture that last less than a few days (i.e., normal rain and drain) are not significant. Significant voltage exposure is defined as being subjected to system voltage for more than twenty-five percent of the time. The moisture and voltage exposures described as significant in these definitions, which are based on operating experience and engineering judgement, are not significant for medium-voltage cables that are designed for these conditions (e.g., continuous wetting and continuous energization is not significant for submarine cables).

2. ***Preventive Actions:*** The inaccessible medium-voltage cables, not subject to 10CFR50.49 environmental qualification requirements, activity detects loss of conductor insulation material properties prior to loss of intended function. There are no preventive or mitigative attributes associated with this activity.

3. ***Parameters Monitored/Inspected:*** A representative sample of in-scope, medium-voltage cables exposed to significant moisture simultaneously with significant voltage are tested to provide an indication of the condition of the conductor insulation. **All cables within the scope of this program will be categorized into groups based on such factors as environment, type of routing (direct buried or buried ductbank), kV rating (4kV to 34.5kV), and type of conductor insulation (e.g., EPR or XLPE). Of the cables in each of these cable groups, a representative sample of approximately 25% will be tested so that all cable groups are sampled.** The specific type of test performed will be determined prior to the initial test and is to be a proven test for detecting deteriorization of the insulation. Each test performed for a cable may be a different type of test.

4. ***Detection of Aging Effects:*** In-scope, medium-voltage cables exposed to significant moisture simultaneously with significant voltage are tested at least once every 10 years. This is an adequate period to preclude failures of the conductor

insulation since experience has shown that aging degradation is a slow process. A 10-year inspection frequency will provide two data points during a 20-year period, which can be used to characterize the degradation rate. The first tests for license renewal are to be completed prior to the period of extended operation.

5. ***Monitoring and Trending:*** Trending actions are not included as part of this activity because the ability to trend test results is dependent on the specific type of test chosen. Although not a requirement, test results that are trendable provide additional information on the rate of degradation.

6. ***Acceptance Criteria:*** The acceptance criteria for each test is defined by the specific type of test performed and the specific cable tested.

7. ***Corrective Actions:*** Identified deviations will be evaluated within the PBAPS corrective action process, which includes provisions for root cause determinations and corrective actions to prevent reoccurrence as dictated by the significance of the deviation.

8. ***Confirmation Process:*** The PBAPS corrective action process includes:
   - Reviews to assure that proposed actions are adequate;
   - Tracking and reporting of open corrective actions; and
   - For root cause determinations, reviews of corrective action effectiveness.

9. ***Administrative Controls:*** All credited aging management activities are subject to administrative controls, which require formal reviews and approvals.

10. ***Operating Experience:*** PBAPS has experienced several failures of XLPE cables due to water-treeing. A replacement program was initiated in 1995 to replace suspected cables with EPR cable, which is highly resistant to treeing. The replacement program was completed in 1999. No age related failures of the replaced cables have occurred.

SUMMARY

This activity applies to inaccessible (e.g., in conduit, duct bank or direct buried) medium-voltage cables within the scope of license renewal that are exposed to significant moisture simultaneously with significant voltage. This activity provides reasonable assurance that loss of conductor insulation material properties of these cables will be detected and addressed prior to the loss of the cable intended function. This activity will be implemented prior to the end of the initial operating license term for PBAPS.

References

EPRI TR-103834-P1-2, "Effects of Moisture on the Life of Power Plant Cables," Electric Power Research Institute, Palo Alto, CA, August 1994.

EPRI TR-109619, "Guideline for the Management of Adverse Localized Equipment Environments," Electric Power Research Institute, Palo Alto, CA, June 1999.

IEEE Std. P1205-2000, "IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations."

NUREG/CR-5643, "Insights Gained From Aging Research," U. S. Nuclear Regulatory Commission, March 1992.

SAND96-0344, "Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations," prepared by Sandia National Laboratories for the U.S. Department of Energy, September 1996.

The following is the summary of B.3.5 aging management activity that will be part of the LRA Appendix A "Updated Final Safety Analysis Report (UFSAR) Supplement.

A.3.5 INACCESSIBLE MEDIUM-VOLTAGE CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

In this aging management activity, in-scope, medium-voltage cables exposed to significant moisture simultaneously with significant voltage are tested to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test. Each test performed for a cable may be a different type of test. This activity will provide reasonable assurance that aging effects on the conductor insulation are detected and addressed such that the intended function of these cables will be maintained for the period of extended operation. This activity will be implemented prior to the end of the initial operating license term for PBAPS.

3.6.1.2.2-1 The applicant should provide a technical justification for high range radiation monitor and neutron monitoring instrumentation cables to demonstrate that visual inspection will be effective in detecting damage before current leakage can affect instrument loop accuracy. **This is Open Item 3.6.1.2.2-1.**

Response to Open Item 3.6.1.2.2-1

SER Open Item 3.6.1.2.2-1 pertains to non-EQ, sensitive, low-level instrumentation cables used in high range radiation and neutron monitoring systems. At PBAPS, the Drywell High Range Radiation Monitoring System has General Atomic radiation monitors and cables that are EQ and identified as subject to a TLAA in PBAPS License Renewal Application Section 4.4.1. The Average Power Range Monitor (APRM), Local Power Range Monitor (LPRM), and the Wide Range Neutron Monitor (WRMN) instrumentation circuits are the non-EQ portions of the Power Range Neutron Monitoring System within the scope of 10CFR54.4. The cables for the LPRMs were replaced in the early 1990s. WRNMs were installed in the late 1990s to replace the Source Range Monitors and Intermediate Range Monitors. The cables for these instrumentation circuits are routed in either flex or rigid conduit. **There are no cables within the APRM instrument circuits that are in an adverse localized environment caused by heat or radiation. The APRM receives the neutron monitoring data from the LPRM detectors and cables.**

The applicant will commit to an aging management activity for the above electrical cables not subject to 10CFR50.49 environmental qualification requirements used in the instrumentation circuits as described below.

This activity is similar to the GALL X1.E2 program.

B.1.17 Electrical Cables Not Subject to 10CFR50.49 Environmental Qualification Requirements Used in Instrumentation Circuits

ACTIVITY DESCRIPTION

The purpose of the aging management activity is to provide reasonable assurance that the intended functions of electrical cables that are not subject to the environmental qualification requirements of 10CFR50.49 and are used in instrumentation circuits with sensitive, low-level signals exposed to adverse localized environments caused by heat, radiation or moisture will be maintained consistent with the current licensing basis through the period of extended operation.

In this aging management activity, reviews of calibration results of surveillance activities are used to identify the potential existence of aging degradation. When an instrumentation circuit is found to be significantly out of calibration, additional evaluation of the circuit, including the cable, is performed.

EVALUATION AND TECHNICAL BASIS

(1) ***Scope of Activity:*** This program applies to electrical cables used in the Local Power Range Monitor (LPRM), and the Wide Range Neutron Monitor (WRMN) instrumentation circuits.

(2) ***Preventive Actions:*** This is a surveillance activity and no actions are taken as part of this activity to prevent or mitigate aging degradation.

(3) ***Parameters Monitored/Inspected:*** The parameters monitored are determined from the PBAPS technical specifications and are specific to the instrumentation circuit being calibrated, as documented in the surveillance test activity.

(4) ***Detection of Aging Effects:*** Review of calibration results of surveillance activities can provide indication of the need for corrective actions by monitoring key parameters and providing data based on acceptance criteria related to instrumentation circuit performance. The normal calibration frequency specified in the PBAPS technical specifications provide reasonable assurance that severe aging degradation will be detected prior to the loss of the cable intended function.

(5) ***Monitoring and Trending:*** Trending actions are not included as part of this activity. Results not meeting acceptance criteria are entered into the corrective action program.

(6) ***Acceptance Criteria:*** The specific type of surveillance activity being performed and the specific instrumentation circuit being reviewed as set out in the PBAPS technical specifications defines the acceptance criterion for each review.

(7) ***Corrective Actions:*** Identified deviations are evaluated within the PBAPS corrective action process which includes provisions for root cause determinations and corrective actions to prevent recurrence as dictated by the significance of the deviation.

(8). ***Confirmation Process:*** The PBAPS corrective action process includes:

- Reviews to assure that proposed actions are adequate;
- Tracking and reporting of open corrective actions; and
- For root cause determinations, reviews of corrective action effectiveness.

(9) ***Administrative Controls:*** All credited aging management activities are subject to administrative controls, which require formal reviews and approvals.

(10) ***Operating Experience:*** PBAPS has experienced degradation of cables in neutron monitoring systems. The cables for the LPRMs were replaced in the late 1990s. WRNMs were installed in the late 1990s to replace the Source Range Monitors and Intermediate Range Monitors. The cables for these instrumentation circuits are run in either flex or rigid conduit. No age related failure resulting in loss of function for these cables has occurred since the cables were replaced.

SUMMARY

This activity applies to electrical cables used in the instrumentation circuits for the LPRM and WRNM instrumentation circuits. The periodic review of the calibration results of the surveillance activities provide reasonable assurance that aging effects are detected and

addressed such that the intended function will be maintained for the period of extended operation.

References

EPRI TR-109619, "Guideline for the Management of Adverse Localized Equipment Environments," Electric Power Research Institute, Palo Alto, CA, June 1999.

IEEE Std. P1205-2000, "IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations."

NUREG/CR-5643, "Insights Gained From Aging Research," U. S. Nuclear Regulatory Commission, March 1992.

SAND96-0344, "Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations," prepared by Sandia National Laboratories for the U.S. Department of Energy, September 1996.

The following is the summary description of the above activity that will be included in the Updated Final Safety Analysis Report (UFSAR) Supplement:

A.1.17 Electrical Cables Not Subject to 10CFR50.49 Environmental Qualification Requirements Used in Instrumentation Circuits

This aging management activity applies to electrical cables used in the Local Power Range Monitor, and Wide Range Neutron Monitor instrumentation circuits. The periodic review of calibration test results is used to identify the potential existence of aging degradation. When an instrumentation circuit is found to be significantly out of calibration, additional evaluation is performed on the circuit, including the cable, as required. This activity will provide reasonable assurance that the intended functions of electrical cables that are not subject to the environmental qualification requirements of 10CFR50.49 and are used in instrumentation circuits with sensitive, low-level signals exposed to adverse localized environments caused by heat, radiation or moisture will be maintained consistent with the current licensing basis through the period of extended operation.

10/28/02 Gave to Meera

Exelon

FAX

To: DAVE SOLORIO	From: JERRY PHILLABAUM
Fax: (301) 415-2279	Street: 200 Exelon Way, KSA [redacted] 1-N-3
Phone: (301) 415-1973	City: Kennett Square
Re: OI 3.0.3.6.2-1	State: PA
Pages: 2	Zip: 19348
CC:	Phone:
Date: 10/28/02	Fax: 610-765-[redacted]5640

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Open Item 3.0.3.6.2-1

In response to RAIs B.1.8-1 and B.1.8-2, the applicant stated that the ISI program is not credited with managing the aging effects of ASME Code class piping in several plant systems, including HPCI, core spray, PCIS, RCIC, and RHR. Instead, the applicant stated the aging was adequately managed by Reactor Coolant System Chemistry (B.1.2), Condensate Storage Tank Chemistry Activities (B.1.4), Closed Cooling Water Chemistry (B.1.3), or Torus Water Chemistry Activities (B.1.5), as applicable. These programs provides chemistry controls only and do not include provisions for any inspections to verify the effectiveness of the programs. Water chemistry programs are designed to mitigate aging effects and not designed to confirm that the aging effect has not occurred. Confirmation of the effectiveness of chemistry programs is needed because they may not be effective in managing aging effect particularly in low or stagnant flow areas and lead to unacceptable degradation. Therefore, it is the staff's position that the applicant should perform inspections, through either the ISI program or one-time inspections, which are credited for license renewal, to verify the effectiveness of the chemistry program credited for managing the effects of aging.

Open Item 3.0.3.6.2-1 response:

In order to verify the effectiveness of the chemistry program, inspections performed as part of the ISI Program for ASME Class 2 piping in the HPCI, RCIC, RHR, and Core Spray systems will be credited for PBAPS license renewal aging management. PCIS (RWCU) is not included here because it is ASME Class 1 piping and is already committed in the ISI program in the LRA. The ISI Program description, B.1.8, has been revised to incorporate this activity and is attached to Open Item 3.1.3.2.1-1. The Fuel Pool Cooling system will be included in the scope of the One-Time Piping Inspection activities to verify the effectiveness of the Fuel Pool Chemistry activities. This is because the Fuel Pool Cooling system is not in the scope of the ISI Program.

Give copy to Meena

10/28/02 gave to Doc

Exelon

FAX

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Re: OI 3.6.1.2.1-1 State: PA

Pages: 5 Zip: 19348

CC: Phone:

Date: 10/28/02 Fax: 610-765-~~5657~~ 5640

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3.6.1.2.1-1 The staff acknowledges that the EPR-insulated replacement cable is more resistant to water-treeing. However, the staff still does not accept the applicant's positions that moisture is not an aging effect requiring aging management for these cables. The staff believes that the discussion and conclusion of the paper, "Assessment of Field Aged 15kV and 35kV Ethylene Propylene Rubber Insulated Cables", do not support the applicant's position that moisture is not an aging effect requiring management at PBAPS. For example, the paper concludes that aging of the EPR-insulated cables can be characterized by an increase in moisture content, growth of water trees, drop in insulation elongation, increase in dissipation factor, and decrease in AC and impulse voltage breakdown strength. Further, the data for water trees, elongation, dissipation factor, and AC and impulse strength indicate that EPR insulated cable deterioration appears to result from moisture permeating the insulation of the cable. Therefore, the applicant has not provided a sufficient technical justification for not requiring an aging management program for inaccessible medium-voltage cables and has not proposed to prevent such cables from being exposed to significant moisture, such as inspecting for water collection in cable manholes and conduit and draining water, as needed. **This is part of Open Item 3.6.1.2.1-1.** The additional part of this open item is discussed in Section 3.6.3.2.1 of this SER.

(From Section 3.6.3.2.1 of this SER) However, as discussed in Section 3.6.1.2.1, the staff does not accept the applicant's position that moisture is not an aging effect requiring an aging management for these cables. The staff is concerned that the applicant has not provided a sufficient technical justification for not requiring an aging management program for buried cables, not specifically designed for a wet environment. **This is the other part of Open Item 3.6.1.2.1-1.**

Response to Open Item 3.6.1.2.1-1

The applicant believes the EPR replacement cable is designed for wet environments, is highly resistant to water treeing, and has an operating life in excess of 30 years. The replacement program commenced in 1995 and was completed in 1999. Although the applicant disagrees with the conclusions of the staff as stated above, the applicant will commit to the following activity for in-scope, inaccessible medium voltage cables not subject to 10CFR50.49 environmental qualification requirements. This program is similar to the GALL program, XI.E3.

B.3.5 INACCESSIBLE MEDIUM-VOLTAGE CABLES NOT SUBJECT TO 10CFR50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

ACTIVITY DESCRIPTION

The purpose of the aging management activity is to provide reasonable assurance that the intended functions of inaccessible medium-voltage cables that are not subject to the environmental qualification requirements of 10CFR50.49 and are exposed to adverse

localized environments caused by significant moisture coincident with significant voltage will be maintained consistent with the current licensing basis through the period of extended operation. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service environment for the cable. An adverse variation in environment is significant if it could appreciably increase the rate of aging of a component or have an immediate adverse effect on operability. This activity considers the technical information and guidance provided in NUREG/CR- In this aging management activity there is no preventive action taken. In a long cable 5643, IEEE Std. P1205, SAND96-0344, and EPRI TR-109619.
run in a conduit, duct bank, or direct buried, most of the length is inaccessible for inspection to determine if it is exposed to significant moisture. Significant moisture is assumed to be present unless engineering data indicates otherwise. If any portion of a medium-voltage cable along its entire run is inaccessible and could be subject to significant moisture exposure, that cable would be identified as inaccessible and included in the sample population subject to testing per this activity.

Evaluation and Technical Basis

1. ***Scope of Program:*** This activity applies to inaccessible (e.g., in conduit, duct bank, or direct buried) medium-voltage cables within the scope of license renewal **(including the SBO Alternate AC source)** that are exposed to significant moisture simultaneously with significant voltage. Significant moisture is defined as periodic exposures to moisture that last more than a few days (e.g., cable in standing water). Periodic exposures to moisture that last less than a few days (i.e., normal rain and drain) are not significant. Significant voltage exposure is defined as being subjected to system voltage for more than twenty-five percent of the time. The moisture and voltage exposures described as significant in these definitions, which are based on operating experience and engineering judgement, are not significant for medium-voltage cables that are designed for these conditions (e.g., continuous wetting and continuous energization is not significant for submarine cables).

2. ***Preventive Actions:*** The inaccessible medium-voltage cables, not subject to 10CFR50.49 environmental qualification requirements, activity detects loss of conductor insulation material properties prior to loss of intended function. There are no preventive or mitigative attributes associated with this activity.

3. ***Parameters Monitored/Inspected:*** A representative sample of in-scope, medium-voltage cables exposed to significant moisture simultaneously with significant voltage are tested to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test and is to be a proven test for detecting deterioration of the insulation. Each test performed for a cable may be a different type of test.

4. ***Detection of Aging Effects:*** In-scope, medium-voltage cables exposed to significant moisture simultaneously with significant voltage are tested at least once every 10 years. This is an adequate period to preclude failures of the conductor insulation since experience has shown that aging degradation is a slow process. A 10-year inspection frequency will provide two data points during a 20-year period, which can be used to characterize the degradation rate. The first tests for license renewal are to be completed prior to the period of extended operation.

5. ***Monitoring and Trending:*** Trending actions are not included as part of this activity because the ability to trend test results is dependent on the specific type of test chosen. Although not a requirement, test results that are trendable provide additional information on the rate of degradation.

6. ***Acceptance Criteria:*** The acceptance criteria for each test is defined by the specific type of test performed and the specific cable tested.

7. ***Corrective Actions:*** Identified deviations will be evaluated within the PBAPS corrective action process, which includes provisions for root cause determinations and corrective actions to prevent reoccurrence as dictated by the significance of the deviation.

8. ***Confirmation Process:*** The PBAPS corrective action process includes:
   - Reviews to assure that proposed actions are adequate;
   - Tracking and reporting of open corrective actions; and
   - For root cause determinations, reviews of corrective action effectiveness.

9. ***Administrative Controls:*** All credited aging management activities are subject to administrative controls, which require formal reviews and approvals.

10. ***Operating Experience:*** PBAPS has experienced several failures of XLPE cables due to water-treeing. A replacement program was initiated in 1995 to replace suspected cables with EPR cable, which is highly resistant to treeing. The replacement program was completed in 1999. No age related failures of the replaced cables have occurred.

SUMMARY

This activity applies to inaccessible (e.g., in conduit, duct bank or direct buried) medium-voltage cables within the scope of license renewal that are exposed to significant moisture simultaneously with significant voltage. This activity provides reasonable assurance that loss of conductor insulation material properties of these cables will be detected and addressed prior to the loss of the cable intended function. This activity will be implemented prior to the end of the initial operating license term for PBAPS.

References

EPRI TR-103834-P1-2, "Effects of Moisture on the Life of Power Plant Cables," Electric Power Research Institute, Palo Alto, CA, August 1994.

EPRI TR-109619, "Guideline for the Management of Adverse Localized Equipment Environments," Electric Power Research Institute, Palo Alto, CA, June 1999.

IEEE Std. P1205-2000, "IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations."

NUREG/CR-5643, "Insights Gained From Aging Research," U. S. Nuclear Regulatory Commission, March 1992.

SAND96-0344, "Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations," prepared by Sandia National Laboratories for the U.S. Department of Energy, September 1996.

The following is the summary of B.3.5 aging management activity that will be part of the LRA Appendix A "Updated Final Safety Analysis Report (UFSAR) Supplement.

A.3.5 INACCESSIBLE MEDIUM-VOLTAGE CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

In this aging management activity, in-scope, medium-voltage cables exposed to significant moisture simultaneously with significant voltage are tested to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test. Each test performed for a cable may be a different type of test. This activity will provide reasonable assurance that aging effects on the conductor insulation are detected and addressed such that the intended function of these cables will be maintained for the period of extended operation. This activity will be implemented prior to the end of the initial operating license term for PBAPS.

10/25/02 Gave to Barry

Exelon

FAX

To: DAVE SOLORIO From: JERRY PHILLABAUM

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Re: OI 3.1.3.2.1-1 State: PA

Pages: 9 Zip: 19348

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Open Item 3.1.3.2.1-1

The application does not identify the aging effect of cracking due to stress corrosion cracking and cyclic loading for valve closure bolting in the reactor pressure vessel instrumentation system. Bolting that is heat treated to a high-hardness condition and exposed to a humid environment within containment could be susceptible to SCC. NUREG-1399, "Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants," indicates that the bolting material with yield strength greater than 150 ksi is susceptible to SCC. For high- strength bolting, the effects of cyclic loading are generally seen in conjunction with SCC in causing crack initiation and growth. In RAI 3.1-1, the staff requested the applicant to take into account the above information and review industry and plant experience to assess whether these aging effects are applicable for valve closure bolting in the reactor pressure vessel instrumentation system. If such an aging effect is present, the applicant should submit an aging management program to manage cracking in valve closure bolting in the reactor pressure vessel instrumentation system. In response to RAI 3.1-1, the applicant provided the following justification for why cracking due to SCC is not considered an applicable aging effect for valve closure bolting in the reactor pressure vessel instrumentation system: PBAPS implemented changes as a result of NRC generic correspondence on bolt cracking. PBAPS has a materials control program in place, which requires an evaluation of all chemicals and consumables to minimize the potential for damage to plant equipment. These administrative controls prevent the introduction of lubricants or sealants that may damage closure bolting. PBAPS does not have a history of closure bolting cracking. The vast majority of bolting failures due to SCCs have occurred at PWRs. Boric acid environment is the primary contributor to these SCC failures. Since PBAPS is a BWR and does not have a boric acid environment, bolting does not experience conditions conducive to stress corrosion crack initiation and propagation. Therefore, cracking due to SCC is not considered an applicable aging effect for closure bolting. In evaluating the susceptibility of bolting material, the applicant did not address the effect of the humid environment within containment and the possibility of high yield strength (>150 ksi) for bolting material. **This is part of Open Item 3.1.3.2.1-1.** Additional parts of this open item are discussed below under the loss of material and loss of preload in Section 3.1.4.2.1.

Response: As indicated in our response to RAI 3.1-1 in our letter dated May 6, 2002, we maintain that bolting is considered a piece-part and not a component, and as such, was not included as a separate line item under component groups. We also maintain that degradation of bolting in BWR's is more event related than age related. Furthermore, Peach Bottom does not use high-strength bolting in the RPV instrumentation system. However, Peach Bottom agrees to credit the Appendix B.1.8, Inservice Inspection (ISI) program to manage the aging effects of cracking due to SCC for bolting in the RPV Instrumentation system. Inspection of the bolting is performed in accordance with the ASME Section XI requirements.

The ISI program will not detect the loss of material on the inside of the carbon steel pipe; therefore is not adequate to assess the effectiveness of the RCS chemistry program to mitigate loss of material in carbon steel components. Therefore, the applicant needs to provide periodic inspections to confirm the effectiveness of the RCS chemistry program for carbon steel components. **This is part of Open Item 3.1.3.2.1-1.**

Response: In order to confirm the effectiveness of the RCS Chemistry program in carbon steel components in the RPV Instrumentation system, a one time inspection will be performed to check wall thickness of the carbon steel piping.
This inspection will be included in the AMP for One Time Inspections.

The AMR did not identify loss of material as an aging effect because several mitigative actions are in place to avoid direct contact between a continuous moisture source and the bolting. These actions include grease coating of bolting during installation, use of antisweat insulation for bolting where the operating temperature is below ambient, and timely repair of any system leakage. However, the applicant does not identify any activities to assess and maintain the effectiveness of grease coating and antisweat insulation. **This is part of Open Item 3.1.3.2.1-1.**

Response: As indicated in our response to RAI 3.1-1 in our letter dated May 6, 2002, we maintain that bolting is considered a piece-part and not a component, and as such, was not included as a separate line item under component groups. We also maintain that degradation of bolting in BWR's is more event related than age related. Furthermore, Peach Bottom operating experience has not identified any age related failures due to loss of material for bolting in the RPV Instrumentation system. However, Peach Bottom agrees to credit the Appendix B.1.8, Inservice Inspection (ISI) program to manage the aging effects of loss of material for bolting in the RPV Instrumentation system. Inspection of the bolting is performed in accordance with the ASME Section XI requirements.

Loss of preload can be caused by factors other than degradation induced by human activities, such as vibration, cyclic loading, gasket creep, and stress relaxation. **This is part of Open Item 3.1.3.2.1-1.**

Response: As indicated in our response to RAI 3.1-1 in our letter dated May 6, 2002, we maintain that bolting is considered a piece-part and not a component, and as such, was not included as a separate line item under component groups. We also maintain that loss of preload (which is designed into the torquing requirements) is more event related than age related. However, Peach Bottom agrees to credit the Appendix B.1.8, Inservice Inspection (ISI) program to manage the aging effects of loss of preload for bolting in the RPV Instrumentation system. Inspection of the bolting is performed in accordance with the ASME Section XI requirements.

(From Section 3.1.4.2.1, Effects of Aging) The application does not identify the aging effect of cracking due to stress corrosion cracking and cyclic loading for closure bolting of the recirculation pumps and valves in the recirculation system. Bolting that is heat treated to a high-hardness condition and exposed to a humid environment within containment could be susceptible to SCC. NUREG-1399, "Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants," indicates that the bolting material with yield strength greater than 150 ksi is susceptible to SCC. For high-strength bolting, the effects of cyclic loading are generally seen in conjunction with SCC in causing crack initiation and growth. This issue is discussed in greater detail in Section 3.1.3.2.1 of the SER. **This is part of Open Item 3.1.3.2.1-1.**

Response: As indicated in our response to RAI 3.1-1 in our letter dated May 6, 2002, we maintain that bolting is considered a piece-part and not a component, and as such, was not included as a separate line item under component groups. We also maintain that degradation of bolting in BWR's is more event related than age related. However, Peach Bottom agrees to credit the Appendix B.1.8, Inservice Inspection (ISI) program to manage the aging effects of cracking due to SCC for bolting in the reactor recirculation system. Inspection of the bolting is performed in accordance with the ASME Section XI requirements.

(From Section 3.1.4.2.1, Effects of Aging) The applicant does not identify loss of material due to corrosion as an aging effect for recirculation pump closure bolting and valve closure bolting in the reactor recirculation system. This issue is discussed in greater detail in Section 3.1.3.2.1 of the SER. **This is part of Open Item 3.1.3.2.1-1.**

Response: As indicated in our response to RAI 3.1-1 in our letter dated May 6, 2002, we maintain that bolting is considered a piece-part and not a component, and as such, was not included as a separate line item under component groups. We also maintain that degradation of bolting in BWR's is more event related than age related. Furthermore, Peach Bottom operating experience has not identified any age related failures due to loss of material for bolting in the reactor recirculation system. However, Peach Bottom agrees to credit the Appendix B.1.8, Inservice Inspection (ISI) program to manage the aging effects of loss of material for bolting in the reactor recirculation system. Inspection of the bolting is performed in accordance with the ASME Section XI requirements.

(From Section 3.1.4.2.1, Effects of Aging) The applicant does not identify loss of material due to wear as an aging effect for recirculation pump closure bolting and valve closure bolting in the reactor recirculation system. In response to RAI 3.1-1, the applicant stated that wear is caused by vibration and prying loads, both of which are event-related mechanisms. Therefore, loss of material due to wear should be excluded from an aging management review. The staff disagrees because vibrations and prying loads that can occur during normal operation and maintenance activities can cause loss of material due to wear. **This is part of Open Item 3.1.3.2.1-1.**

Response: As indicated in our response to RAI 3.1-1 in our letter dated May 6, 2002, we maintain that bolting is considered a piece-part and not a component, and as such, was not included as a separate line item under component groups. We also maintain that degradation of bolting in BWR's is more event related than age related. Furthermore, Peach Bottom operating experience has not identified any age related failures due to loss of material for bolting in the reactor recirculation system. However, Peach Bottom agrees to credit the Appendix B.1.8, Inservice Inspection (ISI) program to manage the aging effects of loss of material due to wear for bolting in the reactor recirculation system. Inspection of the bolting is performed in accordance with the ASME Section XI requirements.

(From Section 3.1.4.2.1, Effects of Aging) However, the staff does not consider the hydrostatic pressure tests adequate because it will not detect the loss of material on the inside of the carbon steel pipe, therefor it will not confirm the effectiveness of the RCS

chemistry program to prevent loss of material in these components. **This is part of Open Item 3.1.3.2.1-1.**

Response: In order to confirm the effectiveness of the RCS Chemistry program in carbon steel components in the reactor recirculation system, a one time inspection will be performed to check wall thickness of the carbon steel piping.
This inspection will be included in the AMP for One Time Inspections.

(From Section 3.1.4.2.1, Effects of Aging) The applicant does not identify loss of preload as an aging effect for recirculation pump closure bolting and valve closure bolting in the reactor recirculation system. This issue is discussed in greater detail in Section 3.1.3.2.1 of this SER. **This is part of Open Item 3.1.3.2.1-1.**

Response: As indicated in our response to RAI 3.1-1 in our letter dated May 6, 2002, we maintain that bolting is considered a piece-part and not a component, and as such, was not included as a separate line item under component groups. We also maintain that loss of preload (which is designed into the torquing requirements) is more event related than age related. However, Peach Bottom agrees to credit the Appendix B.1.8, Inservice Inspection (ISI) program to manage the aging effects of loss of preload for bolting in the reactor recirculation system. Inspection of the bolting is performed in accordance with the ASME Section XI requirements.

The ISI program as described in the LRA Appendix B.1.8 is revised as follows to include the RPV Instrumentation and Reactor Recirculation system bolting in the scope of the program.

B.1.8 Inservice Inspection (ISI) Program

ACTIVITY DESCRIPTION

The inservice inspection (ISI) program, as augmented to address the requirements of GL88-01, provides for condition monitoring of pressure retaining piping and components in the scope of license renewal except for the reactor pressure vessel components and internals. This activity is part of the PBAPS ISI program which complies with the requirements of 1989 Edition of the ASME Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components", and is implemented through a PBAPS specification. The PBAPS ISI program includes requirements for inspections of ASME Class 1, 2, and 3 pressure retaining components. In addition, it provides for condition monitoring of ASME Class 1,2 and 3 piping and equipment supports and integral support anchors in accordance with ASME Code Case N-491-1.

EVALUATION AND TECHNICAL BASIS

(1) Scope of Activity: The ISI program provides for condition monitoring of:

- support members for ASME Class 2 and 3 piping and equipment submerged in raw water or torus grade water,
- ASME Class 3 portions of HPSW, ECW, and ESW systems, including the CS, HPCI, RCIC, and RHR pump room cooling coils, exposed to raw water,

- ECW system piping and equipment support members located in an outdoor environment,
- ASME Class 1 components in the main steam, reactor pressure vessel instrumentation, RCIC and HPCI systems subject to a steam environment,
- ASME Class 1 components in reactor recirculation, reactor pressure vessel instrumentation, SBLC, feedwater, RHR, RCIC, core spray, HPCI, and PCIS (reactor water cleanup) systems subject to a reactor grade water environment,
- ASME Class 2 components in the RHR, RCIC, core spray and HPCI systems subject to a torus grade water environment,
- ASME Class 2 components in the RCIC, core spray and HPCI systems subject to a reactor grade water environment,
- SBLC components from the suction side of the SBLC pumps to the RPV injection isolation valve subject to a borated water environment,
- components in reactor head flange leakoff piping, scram discharge piping, and the steam supply and return portions of the RCIC and HPCI systems subject to a wetted gas environment, and
- reactor pressure vessel closure studs **and pump and valve closure bolting in the RPV instrumentation and reactor recirculation systems.**

*(1) **Preventive Actions:*** The ISI program consists of condition monitoring activities that detect degradation of components before loss of intended function. No preventive or mitigating attributes are associated with these activities.

*(2) **Parameters Monitored/Inspected:*** The ISI program provides for the following condition monitoring in the following environments:

Raw water and torus grade water:

- loss of material monitoring for support members for ASME Class 2 and 3 piping and equipment submerged in raw water or torus water using VT-3 visual inspections for corrosion,
- loss of material and cracking monitoring for components in HPSW, ESW, and ECW systems including the CS, HPCI, RCIC and RHR pump room cooling coils, subject to raw water through flow testing or identification of leakage during pressure tests,
- Verification of chemistry effectiveness for ASME Class 2 components in the RHR, RCIC, core spray and HPCI systems through surface and volumetric examinations of pressure retaining welds and their heat affected zones in piping,

Outdoor:

- loss of material monitoring for ECW system piping and equipment support members located in an outdoor ambient environment using VT-3 visual inspections for corrosion,

Steam:

- loss of material and cracking monitoring for ASME Class 1 components in the main steam, reactor pressure vessel instrumentation, HPCI and RCIC systems through monitoring for leaks during pressure testing,
- loss of material monitoring for ASME Class 1 components in the main steam and HPCI systems by visually inspecting valves for corrosion and pressure retaining wall thickness reduction, when they are disassembled for maintenance,

Reactor grade water:

- loss of material and cracking monitoring for susceptible ASME Class 1 components in the reactor recirculation, reactor pressure vessel instrumentation, SBLC, feedwater, RHR, RCIC, core spray, HPCI and PCIS (reactor water cleanup) systems through monitoring for leaks during pressure testing,
- loss of material and cracking monitoring for susceptible ASME Class 1 components in the reactor recirculation, RHR, core spray, and PCIS (reactor water cleanup) systems by visually inspecting valves or reactor recirculation pump casings for evidence of these aging effects when they are disassembled for maintenance,
- loss of material monitoring for susceptible ASME Class 1 components in the feedwater, RCIC, and HPCI systems by visually inspecting valves for evidence of this aging effect when they are disassembled for maintenance,
- cracking monitoring for susceptible ASME Class 1 components in the reactor recirculation, RHR, core spray, and PCIS (reactor water cleanup) systems through surface and volumetric examinations of pressure retaining welds and their heat affected zones in piping,
- cracking monitoring for ASME Class 1 reactor pressure vessel closure studs and **reactor recirculation pumps closure bolting** through surface and volumetric examinations,
- **loss of material, cracking, and loss of pre-load monitoring for closure bolting in the RPV instrumentation and reactor recirculation systems through visual inspection when they are disassembled for maintenance,**
- loss of fracture toughness monitoring for susceptible ASME Class 1 components in the reactor recirculation and PCIS (reactor water cleanup) systems by visually inspecting reactor water cleanup system valves and reactor recirculation pump casings for evidence of this aging effect when they are disassembled for maintenance,
- Verification of chemistry effectiveness for ASME Class 2 components in the RCIC, core spray and HPCI systems through surface and volumetric examinations of pressure retaining welds and their heat affected zones in piping,

Borated water:

- loss of material and cracking monitoring for SBLC components from the suction side of the SBLC pumps to the RPV injection isolation valve by monitoring for visible leakage of susceptible component pressure boundaries during pressure testing,

Wetted gas:

- loss of material and cracking monitoring for susceptible components in reactor head flange leakoff piping, scram discharge piping, and the steam supply and return portions of the RCIC and HPCI systems through pressure testing.

(4) ***Detection of Aging Effects:*** The method, extent and schedule of the ISI program examinations provide reasonable assurance of detection of cracks, loss of material, loss of pre-load and loss of fracture toughness before loss of intended function.

(5) Monitoring and Trending: The ISI program provides for monitoring for the presence of aging degradation per the guidance provided in the ASME Section XI schedules or Code Case N-491-1. Documentation that facilitates comparison with previous and subsequent inspection results is maintained in accordance with ASME Section XI, IWA-6000.

(6) Acceptance Criteria: Relevant conditions detected during testing are evaluated in accordance with ASME Section XI Articles IWB-3000, IWC-3000 or IWD-3000, for classes 1, 2 and 3 respectively. Conditions detected in support members are evaluated in accordance with PBAPS implementing procedure acceptance criteria that is in agreement with Code Case N-491-1.

(7) Corrective Actions: Identified deviations are evaluated within the PBAPS corrective action process, which includes provisions for root cause determinations and corrective actions to prevent recurrence as dictated by the significance of the deviation.

(8) Confirmation Process: The PBAPS corrective action process includes:

- Reviews to assure that proposed actions are adequate;
- Tracking and reporting of open corrective actions; and
- For root cause determinations, reviews of corrective action effectiveness.

(9) Administrative Controls: All credited aging management activities are subject to administrative controls, which require formal reviews and approvals.

(10) Operating Experience: The ISI program complies with ASME Section XI including Code Case N-491-1. It is reviewed and approved every 10 years. ASME Section XI incorporates industry practice and experience that provides reasonable assurance that it provides early detection, evaluation and corrective actions.

In response to concerns with intergranular stress corrosion cracking (IGSCC), portions of the 304 stainless steel reactor recirculation, PCIS (reactor water cleanup) and RHR piping were replaced with more IGSCC resistant type 316 stainless steel. PBAPS has implemented extensive inspection programs through the ISI program to identify IGSCC.

SUMMARY

The inservice inspection (ISI) program, as augmented to address the requirements of GL 88-01, provides for condition monitoring of pressure retaining piping and components in the scope of license renewal except for those components covered by the reactor pressure vessel and internals ISI program.

This program is part of the PBAPS ISI program, which complies with the requirements of 1989 Edition of the ASME Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components", and is implemented through a PBAPS specification.

Based on the use of industry standards and PBAPS operating experience, there is reasonable assurance that the ISI program will adequately manage the identified aging effects for the piping and components so that intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

REFERENCES

(1) ASME Boiler and Pressure Vessel Code, Section XI, "Rules for In-service Inspection of Nuclear Plant Components," American Society of Mechanical Engineers, New York, NY, 1989.

(2) GL 88-01, NRC Position on IGSCC in BWR Austenitic Stainless Piping, January 25, 1988, including Supplement 1, February 4, 1992

10/24/02 Gave to Dve

Exelon

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Date: 10/24/02 Fax: 610-765-[redacted]5640

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Please pass these OI responses to Duk for his review. If a followup call is required, we will be pleased to support it.

3.6.1.2.1-1 The staff acknowledges that the EPR-insulated replacement cable is more resistant to water-treeing. However, the staff still does not accept the applicant's positions that moisture is not an aging effect requiring aging management for these cables. The staff believes that the discussion and conclusion of the paper, "Assessment of Field Aged 15kV and 35kV Ethylene Propylene Rubber Insulated Cables", do not support the applicant's position that moisture is not an aging effect requiring management at PBAPS. For example, the paper concludes that aging of the EPR-insulated cables can be characterized by an increase in moisture content, growth of water trees, drop in insulation elongation, increase in dissipation factor, and decrease in AC and impulse voltage breakdown strength. Further, the data for water trees, elongation, dissipation factor, and AC and impulse strength indicate that EPR insulated cable deterioration appears to result from moisture permeating the insulation of the cable. Therefore, the applicant has not provided a sufficient technical justification for not requiring an aging management program for inaccessible medium-voltage cables and has not proposed to prevent such cables from being exposed to significant moisture, such as inspecting for water collection in cable manholes and conduit and draining water, as needed. **This is part of Open Item 3.6.1.2.1-1.** The additional part of this open item is discussed in Section 3.6.3.2.1 of this SER.

(From Section 3.6.3.2.1 of this SER) However, as discussed in Section 3.6.1.2.1, the staff does not accept the applicant's position that moisture is not an aging effect requiring an aging management for these cables. The staff is concerned that the applicant has not provided a sufficient technical justification for not requiring an aging management program for buried cables, not specifically designed for a wet environment. **This is the other part of Open Item 3.6.1.2.1-1.**

Response to Open Item 3.6.1.2.1-1

The applicant believes the EPR replacement cable is designed for wet environments, is highly resistant to water treeing, and has an operating life in excess of 30 years. The replacement program commenced in 1995 and was completed in 1999. Although the applicant disagrees with the conclusions of the staff as stated above, the applicant will commit to the following activity for in-scope, inaccessible medium voltage cables not subject to 10CFR50.49 environmental qualification requirements. This program is similar to the GALL program, XI.E3.

B.3.5 INACCESSIBLE MEDIUM-VOLTAGE CABLES NOT SUBJECT TO 10CFR50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

ACTIVITY DESCRIPTION

The purpose of the aging management activity is to provide reasonable assurance that the intended functions of inaccessible medium-voltage cables that are not subject to the environmental qualification requirements of 10CFR50.49 and are exposed to adverse

localized environments caused by significant moisture coincident with significant voltage will be maintained consistent with the current licensing basis through the period of extended operation. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service environment for the cable. An adverse variation in environment is significant if it could appreciably increase the rate of aging of a component or have an immediate adverse effect on operability. This activity considers the technical information and guidance provided in NUREG/CR-5643, IEEE Std. P1205, SAND96-0344, and EPRI TR-109619.

In this aging management activity there is no preventive action taken. In a long cable run in a conduit, duct bank, or direct buried, most of the length is inaccessible for inspection to determine if it is exposed to significant moisture. Significant moisture is assumed to be present unless engineering data indicates otherwise. If any portion of a medium-voltage cable along its entire run is inaccessible and could be subject to significant moisture exposure, that cable would be identified as inaccessible and included in the sample population subject to testing per this activity.

Evaluation and Technical Basis

1. ***Scope of Program:*** This activity applies to inaccessible (e.g., in conduit, duct bank, or direct buried) medium-voltage cables within the scope of license renewal that are exposed to significant moisture simultaneously with significant voltage. Significant moisture is defined as periodic exposures to moisture that last more than a few days (e.g., cable in standing water). Periodic exposures to moisture that last less than a few days (i.e., normal rain and drain) are not significant. Significant voltage exposure is defined as being subjected to system voltage for more than twenty-five percent of the time. The moisture and voltage exposures described as significant in these definitions, which are based on operating experience and engineering judgement, are not significant for medium-voltage cables that are designed for these conditions (e.g., continuous wetting and continuous energization is not significant for submarine cables).

2. ***Preventive Actions:*** The inaccessible medium-voltage cables, not subject to 10CFR50.49 environmental qualification requirements, activity detects loss of conductor insulation material properties prior to loss of intended function. There are no preventive or mitigative attributes associated with this activity.

3. ***Parameters Monitored/Inspected:*** A representative sample of in-scope, medium-voltage cables exposed to significant moisture simultaneously with significant voltage are tested to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test and is to be a proven test for detecting deteriorization of the insulation. Each test performed for a cable may be a different type of test.

4. ***Detection of Aging Effects:*** In-scope, medium-voltage cables exposed to significant moisture simultaneously with significant voltage are tested at least once every 10 years. This is an adequate period to preclude failures of the conductor insulation since experience has shown that aging degradation is a slow process. A 10-year inspection frequency will provide two data points during a 20-year period, which can be used to characterize the degradation rate. The first tests for license renewal are to be completed prior to the period of extended operation.

5. ***Monitoring and Trending:*** Trending actions are not included as part of this activity because the ability to trend test results is dependent on the specific type of test chosen. Although not a requirement, test results that are trendable provide additional information on the rate of degradation.

6. ***Acceptance Criteria:*** The acceptance criteria for each test is defined by the specific type of test performed and the specific cable tested.

7. ***Corrective Actions:*** Identified deviations will be evaluated within the PBAPS corrective action process, which includes provisions for root cause determinations and corrective actions to prevent reoccurrence as dictated by the significance of the deviation.

8. ***Confirmation Process:*** The PBAPS corrective action process includes:
   - Reviews to assure that proposed actions are adequate;
   - Tracking and reporting of open corrective actions; and
   - For root cause determinations, reviews of corrective action effectiveness.

9. ***Administrative Controls:*** All credited aging management activities are subject to administrative controls, which require formal reviews and approvals.

10. ***Operating Experience:*** PBAPS has experienced several failures of XLPE cables due to water-treeing. A replacement program was initiated in 1995 to replace suspected cables with EPR cable, which is highly resistant to treeing. The replacement program was completed in 1999. No age related failures of the replaced cables have occurred.

SUMMARY

This activity applies to inaccessible (e.g., in conduit, duct bank or direct buried) medium-voltage cables within the scope of license renewal that are exposed to significant moisture simultaneously with significant voltage. This activity provides reasonable assurance that loss of conductor insulation material properties of these cables will be detected and addressed prior to the loss of the cable intended function. This activity will be implemented prior to the end of the initial operating license term for PBAPS.

References

EPRI TR-103834-P1-2, "Effects of Moisture on the Life of Power Plant Cables," Electric Power Research Institute, Palo Alto, CA, August 1994.

EPRI TR-109619, "Guideline for the Management of Adverse Localized Equipment Environments," Electric Power Research Institute, Palo Alto, CA, June 1999.

IEEE Std. P1205-2000, "IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations."

NUREG/CR-5643, "Insights Gained From Aging Research," U. S. Nuclear Regulatory Commission, March 1992.

SAND96-0344, "Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations," prepared by Sandia National Laboratories for the U.S. Department of Energy, September 1996.

The following is the summary of B.3.5 aging management activity that will be part of the LRA Appendix A "Updated Final Safety Analysis Report (UFSAR) Supplement.

A.3.5 INACCESSIBLE MEDIUM-VOLTAGE CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

In this aging management activity, in-scope, medium-voltage cables exposed to significant moisture simultaneously with significant voltage are tested to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test. Each test performed for a cable may be a different type of test. This activity will provide reasonable assurance that aging effects on the conductor insulation are detected and addressed such that the intended function of these cables will be maintained for the period of extended operation. This activity will be implemented prior to the end of the initial operating license term for PBAPS.

3.6.1.2.2-1 The applicant should provide a technical justification for high range radiation monitor and neutron monitoring instrumentation cables to demonstrate that visual inspection will be effective in detecting damage before current leakage can affect instrument loop accuracy. **This is Open Item 3.6.1.2.2-1.**

Response to Open Item 3.6.1.2.2-1

SER Open Item 3.6.1.2.2-1 pertains to non-EQ, sensitive, low-level instrumentation cables used in high range radiation and neutron monitoring systems. At PBAPS, the Drywell High Range Radiation Monitoring System has General Atomic radiation monitors that are EQ and identified as subject to a TLAA in PBAPS License Renewal Application Section 4.4.1. The Average Power Range Monitor (APRM), Local Power Range Monitor (LPRM), and the Wide Range Neutron Monitor (WRMN) instrumentation circuits are the non-EQ portions of the Neutron Monitoring System within the scope of 10CFR54.4. The cables for the LPRMs were replaced in the late 1990s. WRNMs were installed in the late 1990s to replace the Source Range Monitors and Intermediate Range Monitors. The cables for these instrumentation circuits are routed in either flex or rigid conduit.

The applicant will commit to an aging management activity for the above electrical cables not subject to 10CFR50.49 environmental qualification requirements used in the instrumentation circuits as described below.

This activity is similar to the GALL X1.E2 program.

B.1.17 Electrical Cables Not Subject to 10CFR50.49 Environmental Qualification Requirements Used in Instrumentation Circuits

ACTIVITY DESCRIPTION

The purpose of the aging management activity is to provide reasonable assurance that the intended functions of electrical cables that are not subject to the environmental qualification requirements of 10CFR50.49 and are used in instrumentation circuits with sensitive, low-level signals exposed to adverse localized environments caused by heat, radiation or moisture will be maintained consistent with the current licensing basis through the period of extended operation.

In this aging management activity, reviews of calibration results of surveillance activities are used to identify the potential existence of aging degradation. When an instrumentation circuit is found to be significantly out of calibration, additional evaluation of the circuit, including the cable, is performed.

EVALUATION AND TECHNICAL BASIS

(1) ***Scope of Activity:*** This program applies to electrical cables used in the Local Power Range Monitor (LPRM), and the Wide Range Neutron Monitor (WRMN) instrumentation circuits.
(2) ***Preventive Actions:*** This is a surveillance activity and no actions are taken as part of this activity to prevent or mitigate aging degradation.

(3) ***Parameters Monitored/Inspected:*** The parameters monitored are determined from the PBAPS technical specifications and are specific to the instrumentation circuit being calibrated, as documented in the surveillance test activity.

(4) ***Detection of Aging Effects:*** Review of calibration results of surveillance activities can provide indication of the need for corrective actions by monitoring key parameters and providing data based on acceptance criteria related to instrumentation circuit performance. The normal calibration frequency specified in the PBAPS technical specifications provide reasonable assurance that severe aging degradation will be detected prior to the loss of the cable intended function.

(5) ***Monitoring and Trending:*** Trending actions are not included as part of this activity. Results not meeting acceptance criteria are entered into the corrective action program.

(6) ***Acceptance Criteria:*** The specific type of surveillance activity being performed and the specific instrumentation circuit being reviewed as set out in the PBAPS technical specifications defines the acceptance criterion for each review.

(7) ***Corrective Actions:*** Identified deviations are evaluated within the PBAPS corrective action process which includes provisions for root cause determinations and corrective actions to prevent recurrence as dictated by the significance of the deviation.

(8). ***Confirmation Process:*** The PBAPS corrective action process includes:

- Reviews to assure that proposed actions are adequate;
- Tracking and reporting of open corrective actions; and
- For root cause determinations, reviews of corrective action effectiveness.

(9) ***Administrative Controls:*** All credited aging management activities are subject to administrative controls, which require formal reviews and approvals.

(10) ***Operating Experience:*** PBAPS has experienced degradation of cables in neutron monitoring systems. The cables for the LPRMs were replaced in the late 1990s. WRNMs were installed in the late 1990s to replace the Source Range Monitors and Intermediate Range Monitors. The cables for these instrumentation circuits are run in either flex or rigid conduit. No age related failure resulting in loss of function for these cables has occurred since the cables were replaced.

SUMMARY

This activity applies to electrical cables used in the instrumentation circuits for the LPRM and WRNM instrumentation circuits. The periodic review of the calibration results of the surveillance activities provide reasonable assurance that aging effects are detected and addressed such that the intended function will be maintained for the period of extended operation.

References

EPRI TR-109619, "Guideline for the Management of Adverse Localized Equipment Environments," Electric Power Research Institute, Palo Alto, CA, June 1999.

IEEE Std. P1205-2000, "IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations."

NUREG/CR-5643, "Insights Gained From Aging Research," U. S. Nuclear Regulatory Commission, March 1992.

SAND96-0344, "Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations," prepared by Sandia National Laboratories for the U.S. Department of Energy, September 1996.

The following is the summary description of the above activity that will be included in the Updated Final Safety Analysis Report (UFSAR) Supplement:

A.1.17 Electrical Cables Not Subject to 10CFR50.49 Environmental Qualification Requirements Used in Instrumentation Circuits

This aging management activity applies to electrical cables used in the Local Power Range Monitor, and Wide Range Neutron Monitor instrumentation circuits. The periodic review of calibration test results is used to identify the potential existence of aging degradation. When an instrumentation circuit is found to be significantly out of calibration, additional evaluation is performed on the circuit, including the cable, as required. This activity will provide reasonable assurance that the intended functions of electrical cables that are not subject to the environmental qualification requirements of 10CFR50.49 and are used in instrumentation circuits with sensitive, low-level signals exposed to adverse localized environments caused by heat, radiation or moisture will be maintained consistent with the current licensing basis through the period of extended operation.

10/23/02 Gave to Greg

Exelon

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Please pass these to the reviewer for acceptance. Please arrange a conference call, if a discussion is needed.

2.4.7.2-1 Based on the applicant's responce to the RAI, the staff reviewed the technical information in USFAR Section 9.2. The staff found that the USFAR Section 9.2.3, "Safety Design Basis," states that the liquid radwaste system prevents the inadvertent release of significant quantities of liquid radioactive material from the site boundary of the plant which could result in radiation exposures to the public in excess of the limits specified in 10 CFR Part 100. USFAR Section 9.2.9 states that leaks or spills from the liquid radwaste system are retained by secondary enclosures such as water-tight dikes and the water-tight dikes support the liquid radwaste system, by providing a barrier, in meeting its safety design of ensuring that a radioactive release to the public in excess of 10 CFR Part 100 limits is prevented. The applicant should include the water-tight dikes within the scope of license renewal and subject them to an AMR or justify their exclusion. **This is Open Item 2.4.7.2-1.**

Response to Open Item 2.4.7.2-1:

The staff's review and findings in UFSAR Sections 9.2.3 and 9.2.9 accurately reflect the content of the Sections and is consistent with our review result of the two Sections. However we questioned the accuracy of Section 9.2.3, with respect to 10CFR100 limits, considering Section 9.2.7 indicates that release of liquid radioactive wastes to the environment is governed by 10CFR20 and that the discharges are sampled prior to release to avoid exceeding 10CFR20 limits. Furthermore, the liquid radwaste system, the condensate storage tanks, the refueling water storage tank, and the dikes, are not classified Seismic Class I (safety related) in Appendix C.1 of the UFSAR. As a result, we performed a detailed review of the facility design basis to establish whether the "Safety Design Basis" of the liquid radwaste system is to prevent inadvertent release of liquid radioactive material which could result in radiation exposures to the public in excess of the limits specified in 10CFR100 or those specified in 10CFR20. A brief summary of the review results is provided below.

- As described in UFSAR Appendix H, PBAPS Units 2 and 3 design was based on the Atomic Energy Commission (AEC) draft of the 27 General Design Criteria for Nuclear Power Plants (November, 1965) and later evaluated against the 70 Criteria proposed in July 1967. Plant effluents are evaluated against GDC Criterion 70 – Control of Releases of Radioactivity to the Environments. The evaluation concluded that "The plant radioactive waste control systems (which include the liquid, gaseous, and solid radwaste subsystems) are designed to limit the potential offsite radiation exposure to levels below the limits of 10CFR20. The plant engineered safeguards are designed to limit the offsite exposure under the postulated design basis accidents to levels below 10CFR100 (Criterion 70.)" (Ref. UFSAR Appendix H, Section H.2.9).

- GDC Criterion 70 states " .. radioactivity control shall be justified (a) on the basis of 10CFR20 requirements for normal operations and for any transient situation that might reasonable be anticipated to occur and (b) on the basis of 10CFR100 dosage level guidelines for potential reactor accidents of low probability of occurrence ..." This requirement is consistent with Plant Safety Analysis objectives presented in UFSAR Section 14. Our review of the Section identified no design bases accident for which the dikes are credited for maintaining radiation limits within 10CFR Part 100.

- UFSAR Section 1.5.1.4, Nuclear Safety Design Criteria (Planned Operation) and Section 1.5.1.5, Nuclear Safety Design Criteria (Abnormal Operational Transients) state that radioactive materials released to the environment, under these operating conditions, would not exceed the limits of 10CFR20.

- UFSAR Section 1.6.1.1.10 (b) states that concentration of liquid waste effluents at the discharge point into the Conowingo Pond will be in compliance with 10CFR20.

- UFSAR Section 1.6.1.6 states that the radioactive waste systems are designed to control the release of plant produced radioactive material to within the limits specified in 10CFR20.

- UFSAR Section 1.8, Summary of Radiation Effects, states the gaseous and liquid radioactive waste systems are designed so that the dose to any person at the site boundary does not exceed that permitted by 10CFR20 under Normal Operation. The analysis for abnormal operational transients does not result in any significant increase of radioactive release over that experienced during normal operation. The doses for accidents are cited as substantially below 10CFR100 limits.

- UFSAR Appendix G.2.2 cites 10CFR20 limits as an unacceptable safety result for "Planned Operation" and "Abnormal Operational Transients". 10CFR100 limits are listed as an unacceptable safety result under accidents.

The staff's evaluation of the design bases for the liquid radwaste systems is documented in Section 8.2 of the original Safety Evaluation for the facility, dated August 11, 1972. In its evaluation the staff considered effluent activity, hydraulic model studies of the dispersion and dilution characteristics and concluded that liquid effluents are less than 10CFR Part 20 limits. The staff's evaluation did not discuss the dikes or 10CFR Part 100 limits.

- UFSAR Appendix C.1 classifies PBAPS structures and equipment as either seismic Class I or seismic Class II. Seismic Class I structures and equipment are those whose failure could increase the severity of the design basis accident, and cause release of radioactivity in excess of 10CFR100 limits, or those essential for safe shutdown and removal of decay heat following a LOCA. Appendix C.1.2 provides a list of structures and equipment which are considered seismic Class I. The dikes, the tanks, and the radwaste systems are not included in the list.

  Seismic Class II structures and equipment are those whose failure would not result in the release of significant radioactivity and would not prevent reactor shutdown. The failure of seismic Class II structures may interrupt power generation. Appendix C.1.3 provides a list of structures and systems which are considered seismic Class II. The tanks, and radwaste systems are included in the list, but not the dikes.

  UFSAR Section 12.2.16 states that watertight dikes around (1) the refueling water storage tank and the Unit 2 condensate storage tank and (2) the Unit 3 condensate storage tank are seismically designed for the effects of maximum ground acceleration due to the design earthquake (OBE). The seismic design is consistent with requirements of Regulatory Guide 1.143, Design Guidance for Radioactive Waste Management Systems, Structures and Components Installed in Light-Water-Cooled Nuclear Power Plants.

The staff's review of design bases for structures and equipment is documented in the original Safety Evaluation for the facility, dated August 11, 1972. In its review, the staff concluded that structures and equipment have been appropriately classified.

On the basis of these reviews we concluded, with reasonable assurance, that the "Safety Design Basis" of the liquid radwaste system is to prevent release of radioactive materials to the environment that exceed the limits of 10CFR20. The reference to 10CFR100 limits may not be incorrect, since 10CFR20 limits are significantly lower than 10CFR100, and it follows that 10CFR100 limits will not be exceeded if 10CFR20 limits are not surpassed. However, the reference to 10CFR100 limits in Section 9.2.3 is misleading and does not accurately reflect design basis of the system. Therefore we plan to revise UFSAR Section 9.2.3 prior to formal submittal of this open item response to indicate that the liquid radwaste system prevents the inadvertent release of liquid radioactive material in excess of 10CFR20 limits, instead of 10CFR100 limits. We will include a copy of revised UFSAR Section 9.2.3 with our formal response.

As for the watertight dikes, our position remains that they are not required to be included in the scope of license renewal. The watertight dikes do support the liquid radwaste system design function, by providing a barrier that ensures liquid radioactive effluents are made in accordance with 10CFR20 limits. However this support function is not an intended function under 10CFR54.4.

10/23/02 Gave to GCRG

Exelon

FAX

To: DAVE SOLORIO

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Street: 200 Exelon Way, KSA ~~[illegible]~~ 1-N-7

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City: Kennett Square

Re: OI 2.3.3.19.2-1 SER PAGES 2-11, 2-18, 2-23, 2-104, 2-107

State: PA

Pages: 18

Zip: 19348

CC:

Phone:

Date: 10/21/02

Fax: 610-765-~~5664~~ 5640

☐ Urgent ☒ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

Please share the revised SER pages and OI response with the technical reviewers. If this doesn't meet the expectations as discussed on 10/15/02, we will be happy to support another conference call.

Previous A2 Response 5/21/2002 w/ 11 systems new 11 systems same systems

The applicant stated in its response to the RAIs that the boundaries for ~~six~~ eight systems already in the scope of license renewal were expanded to include portions of the system that were non-safety-related. Also, ~~N~~ 12 new systems were added to the scope of license renewal due to increased scope of criterion 10 CFR 54.4(a)(2). The non-safety-related components of these systems were found to be in spatial proximity to safety-related components such that an age-related failure of a non-safety-related component could impact the performance of an intended safety function. The response also stated that the component supports were already included in the scope of license renewal and that the applicant utilized the preventive option for this evaluation. This issue was also identified during the NRC Region I inspection of the PBAPS LRA, performed April 15-23, 2002, at the corporate office in Kennett Square, PA, and was the subject of a telecon between the staff and the applicant on June 25, 2001. Open Item 2.3.3.19.2-1, of Section 2.3.3.19 of this SER, was identified because the response to the RAI was not sufficient to allow the staff to determine that all the non-safety related SSCs with the potential to interact with the safety-related SSCs have been identified within the scope of license renewal. Pending the resolution of Open Item 2.3.3.19.2-1 the staff will have sufficient information to determine that the applicant's response to the RAI was sufficient.

During the NRC audit, the applicant provided the team with a detailed discussion on the development and implementation of the system boundary realignment process which is described in Section 2.1.2.1 of the PBAPS LRA and Project Level Instruction (PLI) PLI-001, "Peach Bottom License Renewal Project, Project Level Instruction," Revision 0, dated April 18, 2001, "System Scoping and Realignment of CRL Components," and LR-C-14, "License Renewal Process," Revision 3. In RAI 2.1.2-2, dated January 23, 2002, the staff asked the applicant to further describe the realignment process. In the applicant's response to the RAI dated February 28, 2002, the applicant provided a discussion of five general cases of interfacing system component realignment, developed by the applicant's engineering staff, that provided guidance to the reviewer for identifying and documenting the realigned components to ensure that all SSCs in the CLB that meet the requirements of 10 CFR 54.4(a)(2) and 10 CFR 54.4(a)(3) have been identified and considered for inclusion in the scope of the LRA. Component realignments are performed in accordance with PLI-001 and the results are documented in the license renewal database and on the scoping and screening forms described in LR-C-14. The five cases of component realignment are as follows: Case 1- Components Associated with Containment Penetration; Case 2 - Interfaces Between In-scope and Out-of-scope Mechanical Systems; Case 3 - Interfaces Between In-scope Electrical and Out-of-scope Mechanical Systems; Case 4 - Components Shared Between In-scope and Out-of-scope Systems, and Case 5 - Components Required to Support Specific Intended Functions.

The rationale for the system boundary realignment was to associate system interfacing components with the appropriate license renewal system-level intended functions that they are required to support. This approach allows the appropriate systems and components to be included in the scope of license renewal based on the intended functions of the system, which is also consistent with MR system scoping approach. System safety classifications are documented in the MR scoping evaluations which were used for license renewal scoping. Boundary realignments and any resulting impacts on system level scoping or component screening were reviewed and discussed during the weekly license renewal team meeting. This review assured that the reviewers assigned to the interfacing systems were aware of and concurred with the final boundary alignments. The system boundary realignment process can be considered a recategorization of existing components for license renewal purposes without changes to the CLB or physical changes to the plant. From a system perspective, the out-of-

2.2.2.2 Systems and Structures Not Within the Scope of License Renewal

As stated above, LRA Section 2.2 presents the scoping results for the various Peach Bottom systems and structures. LRA Tables 2.2-1, 2.2-2, and 2.2-3 list the systems and structures, and identify whether the systems and structures are considered within the scope of license renewal. The applicant originally listed 70 mechanical systems in LRA Table 2.2-1, 37 of which were not considered within the scope of license renewal. In response to staff RAIs (discussed in Section 2.1.3), the following additional 17 systems were later brought within the scope:

- service water system
- reactor building closed cooling water system
- reactor water cleanup system
- chilled water system
- water treatment system
- plant equipment and floor drain system
- process sampling system
- auxiliary steam system
- condensate transfer
- refueling water storage and transfer
- torus water cleanup system
- post accident sampling system

The next section documents the staff evaluation of whether the applicant IPA omitted Peach Bottom systems and structures that meet the criteria of 10 CFR 54.4 and therefore should have been included within the scope of license renewal.

2.2.3 Staff Evaluation

In LRA Section 2.1, the applicant describes its IPA methodology for identifying the SCs that are within the scope of license renewal and subject to an AMR. An IPA methodology typically consists of a review of all plant SSCs to determine those that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4. From those plant SSCs that are within the scope of license renewal, the applicant will identify and list those SCs that perform their intended function without moving parts, or without a change in configuration or properties and that are not replaced based on a qualified life or specified time period. The staff reviewed the applicant's scoping and screening methodology, and provided its evaluation in Section 2.1 of this SER. The applicant documented the implementation of that methodology in Sections 2.2 through 2.5 of the LRA.

To ensure that the scoping and screening methodology described in Section 2.1 of the LRA was implemented properly and identified the SCs that are subject to an AMR, the staff performed the following additional review. The staff sampled the contents of the UFSAR based on the listing of systems and structures in Tables 2.2-1 and 2.2-2 of the LRA to identify systems or structures that may have intended functions that meet the scoping requirements of 10 CFR 54.4 but that the applicant does not include within the scope of license renewal. The staff selected several systems and structures to determine how the scoping and screening process was performed to ensure that structures and components (SCs) and their intended functions that need to be in the scope of license renewal are captured in a consistent manner. In a letter to the applicant dated October 30, 2001, the staff requested additional information about how SCs of the (1) battery and emergency switchgear ventilation system, (2) reactor building

- reactor recirculation system
- core spray system
- residual heat removal system
- fuel pool cooling and cleanup system
- control rod drive system
- emergency service water system
- radiation monitoring system

These systems were already within the scope of license renewal but the evaluation of non-safety-related portions of these systems boundaries determined that an age-related failure of the non-safety-related components could impact the performance of a safety-related SC resulting in a loss of a safety-related intended function. In addition, Section 2.2.2.2 of this document identifies non-safety-related systems that were brought within the scope of license renewal due to potential interactions with safety-related SCs. The staff's review of the systems brought into scope because of these potential interactions is in Section 2.3.3.19 of this document.

The applicant's response to the staff's RAIs provided in letters dated November 16, 2001, February 28, May 21, and May 22, 2002 provided the staff reviewers with adequate information to identify and cross-reference realigned components and intended functions from out-of-scope systems in the various LRA tables and descriptions for the Peach Bottom systems within the scope of license renewal.

2.2.4 Conclusions

On the basis of the staff's review of the information presented in Section 2.2 of the LRA, the supporting information in the Peach Bottom UFSAR, and the applicant's responses to the staff RAIs provided in letters dated November 16, 2001, and February 28, May 21, and May 22, 2002, the staff has reasonable assurance that the applicant has adequately identified the SSCs that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21 (a)(1), respectively. The NRC staff's detailed review of the SCs that are subject to an AMR is provided in Sections 2.3 through 2.5 of this SER.

2.3 System Scoping and Screening Results Mechanical

2.3.1 Reactor Coolant System

In Section 2.3.1, "Reactor Coolant System (RCS)," of the Peach Bottom Atomic Power Station, Unit 2 and 3, License Renewal Application (the LRA), Exelon (the applicant) described the systems, structures and components (SSCs) of the RCS that are subject to aging management review (AMR) for license renewal.

2.3.1.1 Reactor Pressure Vessel and Internals

2.3.1.1.1 Summary of Technical Information in the Application

As described in the LRA, the reactor pressure vessel is a vertical, cylindrical pressure vessel with hemispherical heads and is of welded construction. The cylindrical shell and bottom hemispherical head of the reactor vessel are fabricated of low alloy steel plate. The shell is clad on the interior with a stainless steel overlay, and the bottom head with an Inconel overlay. The major safety consideration for the reactor vessel is the ability of the vessel to function as a

The following is a list of non-safety-related systems identified as having a potential for interacting with safety-related systems:

- service water system
- reactor building closed cooling water system
- reactor water cleanup system
- chilled water system
- water treatment system
- plant equipment and floor drain system
- process sampling system
- auxiliary steam system
- condensate transfer
- refueling water storage and transfer
- torus water cleanup system
- post accident sampling system

In addition, the applicant expanded the boundary of the following in-scope systems because non-safety-related portions of these systems have the potential for interacting with other safety-related systems, structures, and components:

- reactor pressure vessel instrumentation system
- reactor recirculation system
- core spray system
- residual heat removal system
- fuel pool cooling and cleanup system
- control rod drive system
- emergency service water system
- radiation monitoring system

Certain components of the reactor building closed cooling water system, chilled water system, plant equipment and floor drain system, process sampling system, and torus water cleanup system associated with the primary containment boundary support the primary containment isolation system (PCIS) intended function of containment isolation. The LRA included these components within the scope of license renewal by realigning them (as defined in Section 2.2 of this SER) from the non-safety-related system to the PCIS for the purpose of license renewal. The PCIS is described in Section 2.3.2.3 of the LRA and the realigned valves and piping are included in LRA Table 2.3.2-3. The PCIS is evaluated in Section 2.3.2.3 of this document.

In the RAI response the applicant provided tables that listed the "component groups" for the above non-safety-related systems and expanded-boundary systems that require an AMR. These are presented in the supplemental tables to the LRA within the RAI response. These tables list the component groups and the passive and long-lived components of each group with their passive functions identified and the AMR results for each component. The applicant identified the following component groups for the non-safety-related systems that are subject to an AMR:

- castings and forgings (valve bodies, pump casings, steam traps, strainer bodies)
- piping (pipe, tubing)
- piping specialities (thermowells, flow elements, restricting orifice)
- heat exchangers (shell, channel heads, unit heater tubes, unit heater headers and connections, ventilation heater tubes, ventilation heater headers and connections, drywell cooler tubes, drywell cooler headers, drywell cooler connections)

- Define the procedure and criteria used to determine the credibility of the spatial interactions of the hazard systems with equipment within the scope of license renewal. Identify the plant area where the potential interactions with safety-related equipment are postulated to occur.

- Explain how non-fluid-containing systems having potential spatial interaction with safety-related systems were evaluated.

- Define the criteria used to designate hazard systems.

- Describe the plant walkdown mentioned in the applicant's May 21, 2002, letter to the NRC and how the results were used to determined which non-safety-related systems, structures, and components were brought within scope.

- Discuss the means by which information that formed the basis for the applicant's conclusions for including the non-safety-related systems within the scope will be documented, auditable, and retrievable, in accordance with 10 CFR 50.37.

This is Open Item 2.3.3.19.2-1.

On the basis of the above review, with the exception of Open Item 2.3.3.19.2-1, the staff did not find any other omissions by the applicant of SSCs within the scope of license renewal.

2.3.3.19.3 Conclusions

On the basis of its review, with the exception of Open Item 2.3.3.19.2-1, the staff concludes there is reasonable assurance that the applicant has adequately identified the ~~non-safety-related and~~ non-safety-related SSCs that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

2.3.4 Steam and Power Conversion Systems

2.3.4.1 Main Steam System

2.3.4.1.1 Summary of Technical Information in the Application

In Section 2.3.4.1 of the LRA, the applicant describes the components of the main steam system that fall within the scope of license renewal and are subject to an AMR. This system is further described in Sections 4.4, 4.11, 6.4.2, and 14.9 of the Peach Bottom UFSAR.

The main steam system conducts steam from the reactor vessel through the primary containment to the steam turbine over the full range of reactor power operation. Four steam lines are utilized between the reactor and the main turbine. The use of multiple lines permits turbine stop valve and main steam line isolation valve tests during plant operation with a minimum amount of load reduction. Each main steam line up to and including the main steam line isolation valve external to the primary containment is seismic Class I.

Open Item 2.3.3.19.2-1

In a letter dated May 21, 2002, the applicant responded to the RAIs. The applicant identified components of non-safety-related systems (listed above) which fall within the scope of license renewal and are subject to an AMR. However, the applicant's RAI response did not supply sufficient information to allow the staff to determine, with reasonable assurance, that all of the SSCs with the potential for non-safety to safety-related interactions had been identified and included within the scope of license renewal. The staff asked the applicant to do the following: (1) define the procedure and criteria used to determine the credibility of the spatial interactions of the hazard systems with equipment within the scope of license renewal. Identify the plant area where the potential interactions with safety-related equipment are postulated to occur; (2) explain how non-fluid-containing systems having potential spatial interaction with safety-related systems were evaluated; (3) define the criteria used to designate hazard systems; (4) describe the plant walkdown mentioned in the applicant's May 21, 2002, letter to the NRC and how the results were used to determined which non-safety-related systems, structures, and components were brought within scope; and (5) discuss the means by which information that formed the basis for the applicant's conclusions for including the non-safety-related systems within the scope will be documented, auditable, and retrievable, in accordance with 10 CFR 50.37.

Open Item 2.3.3.19.2-1 Response:

1. Project Level Instruction PLI - 008, "Review Process for Non Safety-Related to Safety Related SC Interactions," was used to identify non-safety-related systems and components which meet the scoping criteria specified in 10CFR54.4(a)(2) due to potential spatial interactions in which a failure could adversely impact the performance of an intended safety function of safety-related structures, systems or components (SSC). The criteria used to determine the credibility of spatial interaction of the hazard system with safety-related SSC were:

   a. Is a system a hazard? – The answer is yes if the system contains a fluid other than air or gas.
   b. Does the target system contain safety-related target components? – The answer is yes if the system contains active safety-related (SR) components.
   c. Are there portions of the hazard system in the same space as SR target components? – The answer is yes if they occupy the same space, or room in the plant.
   d. Was the hazard system already in the scope of License Renewal (LR)? Systems that were already in the scope of LR already had an aging management review performed.
   e. If the hazard system was already in the scope of license renewal, was the hazard system boundary shrunk to eliminate non-safety-related (NSR) components? NSR portions of in-scope systems need to be reviewed to identify if the NSR portion is considered a hazard.
   f. Is the hazard system in-scope due to spatial interaction? - The answer is yes if the system (or potential hazard portion of the system) was not previously in the scope of LR, and the hazard and space questions (a and c above) are answered yes.

When needed for review of specific portions of systems in potential spatial interaction spaces, component location data was extracted from the Component Record List (CRL) for individual systems or spaces. When spaces are evaluated for the NSR/SR interaction, the results of the evaluations are documented and applied to the systems that occupy those spaces. This approach is most useful for the Turbine and Radwaste Buildings, which have a few SR targets

in spaces where many systems traverse. Individual document files were created for these buildings to document the results for these spaces.

Plant mechanical piping drawings and equipment location drawings were reviewed in conjunction with the CRL location information, as required, to determine where potential spatial interactions could occur. For some spaces, the only SR target components are instruments. A review was performed to determine if the instruments are fail-safe, as is the case for RPS and PCIS instruments. If they are fail-safe, then they were eliminated as SR targets because the intended function would not be lost.

Tables 2.1.2-3-1 and 2.1.2-3-2 were included in our response to RAIs dated May 21, 2002 to identify systems with expanded scope and new systems added. They are included below with 3 additional systems.

Table 2.1.2-3-1 Systems with expanded License Renewal Boundary due to increased scope of criterion 10CFR54.4(a)(2)

System Group	System
Reactor Coolant Systems:	Reactor Pressure Vessel Instrumentation System **Reactor Recirculation System**
Engineered Safety Features Systems:	Core Spray System Residual Heat Removal System
Auxiliary Systems:	Fuel Pool Cooling and Cleanup System Control Rod Drive System **Emergency Service Water System**
Electrical and I&C Systems:	Radiation Monitoring System

Table 2.1.2-3-2 Systems added to the scope of License Renewal due to increased scope of criterion 10CFR54.4(a)(2)

System Group	System
Auxiliary Systems:	Service Water System Reactor Building Closed Cooling Water System Reactor Water Cleanup System Chilled Water System Water Treatment System Plant Equipment and Floor Drain System Process Sampling System Auxiliary Steam System Condensate Transfer Refueling Water Storage and Transfer Torus Water Cleanup System **Post Accident Sampling System**

Terry AMR results when?

Jerry - which ones?

The following table identifies the PBAPS structure in which systems identified ~~as in scope~~ in accordance with 10CFR54.4(a)(2) are located. This matrix includes 3 additional systems from those listed in RAI 2.1.2-3 response:

SYSTEM-STRUCTURE MATRIX

SYSTEM	RB	D/W	D/G	R/W	NSB	CWP	RAB
RPV Instrumentation	x						
Reactor Recirculation	x						
Core Spray	x						
RHR	x						
Fuel Pool Cooling and Cleanup	x	x					
Control Rod Drive	x						
Radiation Monitoring	x		x				x
Emergency Service Water							x
RWCU	x	x					
Service Water	x						x
Reactor Building closed cooling water	x	x					x
Chilled water	x	x		x			
Water treatment	x	x	x				
Plant Equipment and floor drains	x						
Process sampling	x	x		x			x
Auxiliary steam	x		x	x	x	x	x
Condensate transfer	x						
Refueling Water Storage and Transfer	x						
Torus water cleanup	x						
Post Accident Sampling	x						x

Structure legend: RB – Reactor Building; D/W – Drywell (Containment);
D/G – Diesel Generator Building; R/W – Radwaste Building; NSB – Nitrogen Storage Building;
CWP – Circulating Water Pumphouse; RAB – Reactor Auxiliary Bay

Terry? - Explain
Greg I what/what not do you use here?

2. The following provides the rationale for the assumptions considered for NSR system spatial interaction with SR SSCs:

a. Air and gas systems (non-fluid systems) are not a hazard.

Non-fluid-containing component groups (e.g., ventilation duct, instrument air valves, valve actuators, etc.) that are spatially orientated near safety-related components are located in sheltered areas and, therefore, are not exposed to adverse environments that promote age-related degradation. An operating experience review was completed as part of the aging management reviews. Twenty-four NRC Information Notices, IE Bulletins and Generic Letters were reviewed for the non-fluid environments of ventilation, gas and the external environments (air). In addition, a plant specific operating experience review of these same environments included 12 potentially relevant corrective action reports and 57 potentially relevant work orders. This operating experience review of non-fluid containing systems performed for the systems included in-scope of license renewal has shown no failures due to aging have occurred in the industry for the materials and environment. Additionally, non-fluid containing components cannot affect safety-related SSCs due to leakage or spray.

b. Do not need to consider piping falling down.

NUREG/CR-6239 "Survey of Strong Motion Earthquake Effects on Thermal Power Plants in California with Emphasis on Piping Systems" in section 4.5 states that in approximately 2,000,000 feet of pipe, 99.8% of which had not been seismically designed, which experienced earthquakes with peak ground acceleration in excess of 0.2g, the subject piping did not experience a single pipe segment failure. The experience data includes aged piping, since several of the plants surveyed had been in operation since the 1950's and 1960's.
Thus, with regard to non-safety-related piping segments falling:

- No experience data exists of welded steel pipe segments falling due to a strong motion earthquake
- Falling of piping segment is extremely rare and only occurs when there is a failure or unzipping of the supports
- These observations hold for new and aged pipe
- All pipe supports in class I buildings (except Recombiner Building) are included in the scope of license renewal. There are no active safety-related target components in the Recombiner Building.

c. Missiles from rotating equipment or pipe whip.

Inherent safety features to protect safety-related equipment from jet impingement, pipe whip and missiles have been included in the scope of license renewal. All class I structures, including internal walls, floors, ceilings are in scope of license renewal. Protection features such as pipe whip restraints, missile barriers, blow-out panels, etc. are included as part of the building structure.

d. Fail-safe devices are not targets, because their function is not affected.

Some potential safety-related target components are fail-safe by design. Fail-safe components are components whose intended function cannot be prevented by any

credible interaction with a non-safety-related system, structure or component. Such fail-safe components are not considered as targets for NSR/SR system interaction reviews.

e. SR passive components are not targets.

SR failures occur shortly after the NSR failure; therefore, long term aging effects are eliminated for passive components due to the NSR failure. The basis for this is that leaks would be identified soon by operator rounds, radwaste sump pumpout trends, or by system parameter monitoring and alarms, and that appropriate corrective actions would be taken.

3. A system is designated as a hazard system if it contains a fluid other than air or gas, irrespective of pressure and temperature of the contained fluid.

4. Plant walkdowns were performed for two possible reasons. In some cases, walkdowns were conducted in areas where potential spatial interactions needed to be verified. In other cases, walkdowns were conducted to identify material information as needed for in-scope NSR components. These plant walkdowns are documented in a walkdown file.

5. To meet the requirements of 10CFR54.37, documents will be created for systems in the scope of license renewal because of criterion 10CFR54.4(a)(2) similar to those documents created for systems in the scope of license renewal that meet criterion 10CFR54.4 (a)(1) or 10CFR54.4(a)(3). These documents consist of scoping and screening forms, aging management reviews, boundary drawings, CRL updates, and procedure annotations of commitments.

The six column tables attached identify the component groups and aging management activities for additional systems and components added to the scope of license renewal as a result of the NSR/SR interaction reviews.

System: Reactor Recirculation System
Title: Aging Management Review Results for component groups in the Reactor Recirculation System

Component Group	Component Intended Function	Environment	Material of Construction	Aging Effect	Aging Management Activity
Casting and Forging • Valve Bodies	Pressure Boundary	Reactor Water	Stainless Steel	Loss of Material	Reactor Water Chemistry B.1.2
Casting and Forging • Valve Bodies	Pressure Boundary	Reactor Water	Stainless Steel	Cracking	Reactor Water Chemistry B.1.2
Piping • Pipe • Tubing	Pressure Boundary	Reactor Water	Stainless Steel	Loss of Material	Reactor Water Chemistry B.1.2
Piping • Pipe • Tubing	Pressure Boundary	Reactor Water	Stainless Steel	Cracking	Reactor Water Chemistry B.1.2
Piping Specialties • Restricting Orifice	Pressure Boundary	Reactor Water	Stainless Steel	Loss of Material	Reactor Water Chemistry B.1.2
Piping Specialties • Restricting Orifice	Pressure Boundary	Reactor Water	Stainless Steel	Cracking	Reactor Water Chemistry B.1.2

System: Emergency Service Water System
Title: Aging Management Review Results for component groups in the Emergency Service Water System

Component Group	Component Intended Function	Environment	Material of Construction	Aging Effect	Aging Management Activity
• Valve Bodies	Pressure Boundary	Raw Water	Plastic	None	Not applicable
Piping • Pipe • Tubing	Pressure Boundary	Raw Water	Plastic	None	Not applicable

System: Post Accident Sampling System
Title: Aging Management Review Results for component groups in the Post Accident Sampling System

Component Group	Component Intended Function	Environment	Material of Construction	Aging Effect	Aging Management Activity
Casting and Forging • Valve Bodies	Pressure Boundary	Reactor Water	Stainless Steel	Loss of Material	Reactor Water Chemistry B.1.2
Casting and Forging • Valve Bodies	Pressure Boundary	Reactor Water	Stainless Steel	Cracking	Reactor Water Chemistry B.1.2
Casting and Forging • Valve Bodies	Pressure Boundary	Demineralized Water	Stainless Steel	Loss of Material	Demineralized Water Chemistry B.1.4
Casting and Forging • Valve Bodies	Pressure Boundary	Demineralized Water	Stainless Steel	Cracking	Demineralized Water Chemistry B.1.4
Piping • Pipe • Tubing	Pressure Boundary	Reactor Water	Stainless Steel	Loss of Material	Reactor Water Chemistry B.1.2
Piping • Pipe • Tubing	Pressure Boundary	Reactor Water	Stainless Steel	Cracking	Reactor Water Chemistry B.1.2
Piping • Pipe	Pressure Boundary	Demineralized Water	Stainless Steel	Loss of Material	Demineralized Water Chemistry B.1.4
Piping • Pipe	Pressure Boundary	Demineralized Water	Stainless Steel	Cracking	Demineralized Water Chemistry B.1.4

System: Reactor Building Closed Cooling Water System
Title: Aging Management Review Results for component groups in the Reactor Building Closed Cooling Water System

Component Group	Component Intended Function	Environment	Material of Construction	Aging Effect	Aging Management Activity
Casting and Forging • Valve Bodies • Pump Casings	Pressure Boundary	Closed Cooling Water	Carbon Steel	Loss of Material	CCW Chemistry B.1.3
Casting and Forging • Valve Bodies	Pressure Boundary	Closed Cooling Water	Stainless Steel	Loss of Material	CCW Chemistry B.1.3
Casting and Forging • Valve Bodies	Pressure Boundary	Closed Cooling Water	Stainless Steel	Cracking	CCW Chemistry B.1.3
Casting and Forging • Valve Bodies	Pressure Boundary	Closed Cooling Water	Bronze	Loss of Material	CCW Chemistry B.1.3
Casting and Forging • Valve Bodies	Pressure Boundary	Closed Cooling Water	Cast Iron	Loss of Material	CCW Chemistry B.1.3
Casting and Forging • Valve Bodies	Pressure Boundary	Closed Cooling Water	Brass	Loss of Material	CCW Chemistry B.1.3
Casting and Forging • Valve Bodies	Pressure Boundary	Closed Cooling Water	Brass	Cracking	CCW Chemistry B.1.3
Heat Exchangers • Shell	Pressure Boundary	Closed Cooling Water	Carbon Steel	Loss of Material	CCW Chemistry B.1.3
Heat Exchangers • Channel heads	Pressure Boundary	Raw Water	Carbon Steel	Loss of Material	One-Time Piping Inspection B.3.3
Piping • Pipe	Pressure Boundary	Closed Cooling Water	Carbon Steel	Loss of Material	CCW Chemistry B.1.3
Piping • Pipe • Tubing	Pressure Boundary	Closed Cooling Water	Stainless Steel	Loss of Material	CCW Chemistry B.1.3

Component Group	Component Intended Function	Environment	Material of Construction	Aging Effect	Aging Management Activity
Piping • Pipe • Tubing	Pressure Boundary	Closed Cooling Water	Stainless Steel	Cracking	CCW Chemistry B.1.3
Piping • Pipe	Pressure Boundary	Closed Cooling Water	Copper	Loss of Material	CCW Chemistry B.1.3
Piping • Pipe	Pressure Boundary	Closed Cooling Water	Copper	Cracking	CCW Chemistry B.1.3
Piping Specialties • Thermowells	Pressure Boundary	Closed Cooling Water	Carbon Steel	Loss of Material	CCW Chemistry B.1.3
Piping Specialties • Restricting Orifice • ***Flexible Hoses***	Pressure Boundary	Closed Cooling Water	Stainless Steel	Loss of Material	CCW Chemistry B.1.3
Piping Specialties • Restricting Orifice • ***Flexible Hoses***	Pressure Boundary	Closed Cooling Water	Stainless Steel	Cracking	CCW Chemistry B.1.3
Vessel • Head Tank • Chemical Addition Tank	Pressure Boundary	Closed Cooling Water	Carbon Steel	Loss of Material	CCW Chemistry B.1.3

System: Chilled Water System
Title: Aging Management Review Results for component groups in the Chilled Water System

Component Group	Component Intended Function	Environment	Material of Construction	Aging Effect	Aging Management Activity
Casting and Forging • Valve Bodies	Pressure Boundary	Closed Cooling Water	Carbon Steel	Loss of Material	CCW Chemistry B.1.3
Casting and Forging • Valve Bodies	Pressure Boundary	Closed Cooling Water	Stainless Steel	Loss of Material	CCW Chemistry B.1.3
Casting and Forging • Valve Bodies	Pressure Boundary	Closed Cooling Water	Stainless Steel	Cracking	CCW Chemistry B.1.3
Casting and Forging • Valve Bodies	Pressure Boundary	Closed Cooling Water	Bronze	Loss of Material	CCW Chemistry B.1.3
Casting and Forging • Valve Bodies	Pressure Boundary	Closed Cooling Water	Brass	Loss of Material	CCW Chemistry B.1.3
Casting and Forging • Valve Bodies	Pressure Boundary	Closed Cooling Water	Brass	Cracking	CCW Chemistry B.1.3
Casting and Forging • Valve Bodies	Pressure Boundary	Closed Cooling Water	Cast Iron	Loss of Material	CCW Chemistry B.1.3
Heat Exchanger • Drywell Coolers (Tubes)	Pressure Boundary	Closed Cooling Water	Copper	Loss of Material	CCW Chemistry B.1.3
Heat Exchanger • Drywell Coolers (Tubes)	Pressure Boundary	Closed Cooling Water	Copper	Cracking	CCW Chemistry B.1.3
Heat Exchanger • Drywell Coolers (Headers)	Pressure Boundary	Closed Cooling Water	Copper	Loss of Material	CCW Chemistry B.1.3
Heat Exchanger • Drywell Coolers (Headers)	Pressure Boundary	Closed Cooling Water	Copper	Cracking	CCW Chemistry B.1.3

Component Group	Component Intended Function	Environment	Material of Construction	Aging Effect	Aging Management Activity
Heat Exchanger • Drywell Coolers (Connections)	Pressure Boundary	Closed Cooling Water	Carbon Steel	Loss of Material	CCW Chemistry B.1.3
Piping • Pipe	Pressure Boundary	Closed Cooling Water	Carbon Steel	Loss of Material	CCW Chemistry B.1.3
Piping • Pipe • Tubing	Pressure Boundary	Closed Cooling Water	Copper	Loss of Material	CCW Chemistry B.1.3
Piping • Pipe • Tubing	Pressure Boundary	Closed Cooling Water	Copper	Cracking	CCW Chemistry B.1.3
Piping Specialties • Flow Elements	Pressure Boundary	Closed Cooling Water	Bronze	Loss of Material	CCW Chemistry B.1.3
Piping Specialties • ***Flexible Hoses***	***Pressure Boundary***	***Closed Cooling Water***	***Stainless Steel***	***Loss of Material***	***CCW Chemistry B.1.3***
Piping Specialties • ***Flexible Hoses***	***Pressure Boundary***	***Closed Cooling Water***	***Stainless Steel***	**Cracking**	***CCW Chemistry B.1.3***

System: Torus Water Cleanup System
Title: Aging Management Review Results for component groups in the Torus Water Cleanup System

Component Group	Component Intended Function	Environment	Material of Construction	Aging Effect	Aging Management Activity
Casting and Forging • Valve Bodies • ***Y-Strainer***	Pressure Boundary	Torus Water	Carbon Steel	Loss of Material	Torus Water Chemistry B.1.5
Casting and Forging • Valve Bodies	Pressure Boundary	Torus Water	Stainless Steel	Loss of Material	Torus Water Chemistry B.1.5
Casting and Forging • Valve Bodies	Pressure Boundary	Torus Water	Stainless Steel	Cracking	Torus Water Chemistry B.1.5
Piping • Pipe	Pressure Boundary	Torus Water	Carbon Steel	Loss of Material	Torus Water Chemistry B.1.5
Piping • Pipe • Tubing	Pressure Boundary	Torus Water	Stainless Steel	Loss of Material	Torus Water Chemistry B.1.5
Piping • Pipe • Tubing	Pressure Boundary	Torus Water	Stainless Steel	Cracking	Torus Water Chemistry B.1.5

10/23/02 Gave to Janak + Greg

Exelon

FAX

To: DAVE SOLORIO From: JERRY PHILLABAUM

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Phone: (301) 415-1973 City: Kennett Square

Re: OI 2.3.2.7.2-1
OI 2.3.2.7.2-2
OI 2.3.8.8.2-1
OI 2.3.3.8.2-2
OI 2.3.3.9.2-1 State: PA

Pages: Zip: 19348

CC: Phone:

Date: 10/24/02 Fax: 610-765-~~5650~~ 5640

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Please provide this to Janak Raval.

2.3.2.7.2-1 The staff considers the applicants response is partially acceptable since prefilters, HEPA filters, and charcoal filters are governed by technical specification (TS) requirements or plant procedures which provide for their replacement in accordance with TS surveillance requirements or plant procedures. The staff does not agree that the demisters, fire spray nozzles, and heating coils should be excluded from AMR because if any one of these components should fail, the intended function of the filtration unit may not be accomplished. **This is Open Item 2.3.2.7.2-1.**

Open Item 2.3.2.7.2-1 Resolution:

LRA Table 2.3.2-7 is revised to include the demisters, as shown below.

Table 2.3.2-7 Component Groups Requiring Aging Management Review - Standby Gas Treatment System

Component Group	Component Intended Function	Environment
Casting and Forging • Valve Bodies	• Pressure Boundary	Ventilation Atmosphere, Sheltered
Elastomer • Fan Flex Connections • Filter Plenum Access Door Seals	• Pressure Boundary	Ventilation Atmosphere, Sheltered
Piping • Pipe	• Pressure Boundary	Buried
Piping • Pipe • Tubing • Fittings	• Pressure Boundary	Sheltered
Piping • Pipe • Tubing • Fittings	• Pressure Boundary	Ventilation Atmosphere
Piping Specialties • Flow Elements • Pressure Elements • Temperature Element Couplings	• Pressure Boundary	Ventilation Atmosphere, Sheltered
Sheet Metal • Ducting • Plenums • Fan Enclosures • Damper Enclosures	• Pressure Boundary	Ventilation Atmosphere, Sheltered
Sheet Metal • Louvers	• Throttle	Ventilation Atmosphere
Sheet Metal • ***Demisters***	• ***Filter***	***Ventilation Atmosphere***

LRA Table 3.2-7 is revised to include the demisters, as shown below.

Table 3.2-7 Aging Management Review Results for Component Groups in the Standby Gas Treatment System

Component Group	Component Intended Function	Environment	Materials of Construction	Aging Effect	Aging Management Activity
Casting and Forging • Valve Bodies	• Pressure Boundary	Sheltered, Ventilation Atmosphere	Carbon Steel, Stainless Steel, Bronze, Brass	None	• Not Applicable
Elastomer • Fan Flex Connections	• Pressure Boundary	Ventilation Atmosphere, Sheltered	Fiberglass Impregnated Neoprene	Change in Material Properties	• Ventilation System Inspection and Testing (B.2.3)
Elastomer • Filter Plenum Access Door Seals	• Pressure Boundary	Ventilation Atmosphere, Sheltered	Sponge Neoprene Rubber	Change in Material Properties	• Ventilation System Inspection and Testing (B.2.3)
Piping • Pipe	• Pressure Boundary	Buried	Carbon Steel	Loss of Material	• Outdoor, Buried and Submerged Component Inspection (B.2.5)
Piping • Pipe • Tubing • Fittings	• Pressure Boundary	Sheltered	Carbon Steel, Stainless Steel, Copper, Dielectric Unions	None	• Not Applicable
Piping • Pipe	• Pressure Boundary	Ventilation Atmosphere	Carbon Steel	None	• Not Applicable
Piping • Fittings	• Pressure Boundary	Ventilation Atmosphere	Carbon Steel, Dielectric Unions	None	• Not Applicable
Piping • Tubing	• Pressure Boundary	Ventilation Atmosphere	Copper, Stainless Steel	None	• Not Applicable

Component Group	Component Intended Function	Environment	Materials of Construction	Aging Effect	Aging Management Activity
Piping Specialties • Flow Elements • Pressure Elements • Temperature Element Couplings	• Pressure Boundary	Sheltered, Ventilation Atmosphere	Carbon Steel, Stainless Steel, Anodized Aluminum	None	• Not Applicable
Sheet Metal • Ducting • Plenums • Fan Enclosures • Damper Enclosures	• Pressure Boundary	Sheltered	Carbon Steel, Galvanized Steel	None	• Not Applicable
Sheet Metal • Plenums	• Pressure Boundary	Ventilation Atmosphere	Carbon Steel	None	• Not Applicable
Sheet Metal • Fan Enclosures	• Pressure Boundary	Ventilation Atmosphere	Carbon Steel	None	• Not Applicable
Sheet Metal • ***Demisters***	• ***Filter***	***Ventilation Atmosphere***	***Carbon Steel***	***None***	• ***Not Applicable***
Sheet Metal • Louvers	• Throttle	Ventilation Atmosphere	Galvanized Steel	None	• Not Applicable
Sheet Metal • Ducting • Damper Enclosures	• Pressure Boundary	Ventilation Atmosphere	Galvanized Steel	None	• Not Applicable

The fire spray nozzles are included in the scope of license renewal under the Fire Protection system. These nozzles are included in LRA Table 2.3.3-7 as Piping Specialties – Discharge Nozzles, ***and subject to an AMR***.

The heating coils are electric heating coils. These heating coils do not have a pressure boundary housing. They are installed and enclosed within the standby gas treatment system filter plenum. The plenum is included in LRA Table 2.3.2-7 ***and subject to an AMR***. These electric heating coils are active components and are therefore not subject to an aging management review.

Open Item 2.3.2.7.2-2 Resolution:

License renewal drawings LR-M-391 sheets 1 and 2 show portions of the standby gas treatment system and portions of the secondary containment system that are in the scope of license renewal. System boundary flags delineate these two systems. The secondary containment system includes air-operated butterfly valves and does not include any dampers (P&ID symbols for butterfly valves and dampers are shown on LR-M-300 sheet 2). Therefore, LRA Table 2.3.2-8, Component Groups Requiring Aging Management Review – Secondary Containment System, includes valve bodies but does not include damper enclosures. The standby gas treatment system includes both air-operated butterfly valves and dampers. Therefore, LRA Table 2.3.2-7, Component Groups Requiring Aging Management Review – Standby Gas Treatment System, includes both valve bodies and damper enclosures.

Open Item 2.3.3.8.2-1 Response:

The control room emergency ventilation system charcoal and HEPA filters shown on drawing LR-M-384 sheet 1 are installed and fully enclosed inside a common filter plenum. The filter plenum is included in the scope of license renewal ***and subject to an AMR***, and is identified in LRA Table 2.3.3-8 as a sheet metal plenum.

Open Item 2.3.3.8.2-2 Response:

The Control Room Ventilation System (briefly described in LRA Section 2.3.3.8) consists of the Control Room Fresh Air Supply (CRFAS) System, the Control Room Emergency Ventilation (CREV) Filter System, the Control Room Air Conditioning Ventilation (A/C Vent) Supply System, the Control Room Return Air System, and the Control Room Toilet Exhaust System. Of these, only the Control Room Fresh Air Supply System and the Control Room Emergency Ventilation Filter System are safety related and relied upon to assure control room habitability. Detailed system descriptions are provided below.

The CR Fresh Air Supply System is a safety related system that provides air to the main control room (MCR). The CR Fresh Air Supply System consists of two 100% capacity, redundant CR Fresh Air Supply Fans 0AV079 and 0BV079, Roll Filter 00F039, and Preheat Coil 00E068. The CR Fresh Air Supply System is supplied with outside air from the Outside Air Intake Plenum. The outside air ductwork connects with the CR Fresh Air Supply Roll Filter, the CR Area Preheat Coil, and then to the inlet ducts of the redundant CR Fresh Air Supply Fans which are provided with intake dampers. There are two (2) flow detectors mounted in the duct upstream of the Control Room Fresh Air Supply Fans. The outlet ducts from these fans are provided with discharge dampers and connect to a common discharge duct. The common discharge duct is connected to additional ductwork provided with balance dampers that allow the outside air to be distributed directly to the control room area rooms (during emergency operation) or to the inlet of the CR A/C Vent Supply System where it combines with return air from the CR Return Air System (during normal operation). The CR Fresh Air Supply System and associated components, ductwork and housings, are included in the scope of license renewal as shown on drawing LR-M-384 sheet 1.

The CR Emergency Ventilation Filter System is a safety related system which consists of two 100% capacity filter units and redundant CREV Supply Fans 0AV030 and 0BV030. Each filter unit consists of a charcoal filter 0AF042 (0BF042) and two banks of HEPA filters 0AF041 (0BF041) and 0AF050 (0BF050), upstream and downstream of the charcoal filter. The CR Emergency Ventilation Filter System is supplied with outside air by two redundant ducts connected to the common outside air duct between the CR Area Pre-heater Coil and the intake ducts to the CR Fresh Air Supply Fans. The redundant ducts connect to the intake ducts of the redundant filter units. The outlet ducts of the filter units then connect to the inlet ducts of the redundant CREV Supply Fans. The outlet ducts from these fans connect to a common discharge duct and is used to distribute air to the control room area rooms. The CR Emergency Ventilation Filter System and associated components, ductwork and housings, are included in the scope of license renewal as shown on drawing LR-M-384 sheet 1.

The CR A/C Vent Supply System is a non-safety related system which consists of the CR A/C Supply Roll Filter 0OF038, CR A/C Ventilation Supply Bag Filter 0OF057, two 100% capacity, redundant CR A/C Supply Cooling Coils 0AE069 and 0BE069, two 100% capacity redundant humidifiers, two 100% capacity, redundant CR A/C Vent Supply Fans 0AV028 and 0BV028, CR Zone Reheat Coil 00E072, the CR North Office A/C Fan Suction Filter 00F327, CR North Office Cooling Coil 00E396, and CR North Office Cooling Unit Fan 00V326. The CR A/C Vent Supply System is supplied with outside air from the CR Fresh Air Supply System. A common duct connects with the CR Return Air System and then connects to the CR A/C Supply Roll Filter, the CR A/C Ventilation Supply Bag Filter, and the inlet ducts to the redundant CR A/C Supply Cooling Coils that are provided with dampers. A by-pass duct with a damper is provided around each cooling coil. Humidifiers are provided in each cooling coil discharge duct that connects to the CR A/C Vent Supply Fans. The discharge ducts from the supply fans are provided with dampers and then connect to the common duct serving the control room area rooms. The CR Zone Reheat Coil is installed in the common duct. Provision has been made for purging of the Main Control Room by providing a separate Purge Air Outside Air Intake Plenum and the CR Purge Air Preheat Coil 00E110. With the exception of the CR Zone Reheat Coil 00E072, the CR A/C Vent Supply System is not safety related and is not required to maintain control room habitability. The CR Fresh Air Supply System and the CR Emergency Ventilation Filter System (each described

above) are adequate to assure control room habitability. The CR A/C Vent Supply System is not included in the scope of license renewal, as shown on license renewal drawings LR-M-384 sheets 2 and 3. The CR Zone Reheat Coil 00E072 is located in ductwork common with the CR Emergency Ventilation Filter System, and is therefore included in the scope of license renewal as shown on license renewal drawing LR-M-384 sheet 3.

The CR Return Air System is a non-safety related system which consists of two 100% capacity, redundant CR Ventilation Return Fans 0AV029 and 0BV029. Redundant return air ducts, provided with dampers, are connected to the Main Control Room and the Control Room Peripheral Area. The return air ducts are connected to a common return duct, which is then connected to the inlet ducts of the CR Ventilation Return Fans. The inlet ducts are provided with intake dampers. The discharge ducts from the return fans are provided with dampers and connect to a common duct, which allows the return air to either be returned to the CR A/C Vent Supply System or to be exhausted through an exhaust structure located on the Control Room roof. The CR Return Air System is not safety related and is not required to maintain control room habitability. The CR Fresh Air Supply System and the CR Emergency Ventilation Filter System (each described above) are adequate to assure control room habitability. The CR Return Air System is not included in the scope of license renewal, as shown on license renewal drawings LR-M-384 sheet 3.

The CR Toilet Exhaust System is a non-safety related system which consists of the CR Toilet Exhaust Fan 00V033. Exhaust ducts from the Main Control Room Ceiling Area, Lunch Room, and Toilet Room are connected to the inlet of the CR Toilet Exhaust Fan. The outlet duct is connected to an exhaust structure located on the Control Room roof, which provides for the discharge of the exhaust air to the atmosphere. The CR Toilet Exhaust System is not safety related and is not required to maintain control room habitability. The CR Fresh Air Supply System and the CR Emergency Ventilation Filter System (each described above) are adequate to assure control room habitability. The CR Toilet Exhaust System is not included in the scope of license renewal, as shown on license renewal drawings LR-M-384 sheet 3.

As indicated in LRA Section 2.3.3.8, the intended functions of the Control Room Ventilation System are Control Room Isolation and Filtration and Ventilation. Normal control room cooling, such as that provided by the Control Room Air Conditioning Ventilation Supply System using cooling coils supplied by the Chilled Water System, is not a safety-related intended function. The Ventilation function, accomplished by operation of the Control Room Fresh Air Supply System or the Control Room Emergency Ventilation Filter System, provides adequate cooling for control room habitability by providing a constant supply of outside air to the control room. If needed, the Control Room Emergency Ventilation Filter System can filter the outside air.

This Open Item lists supply fans 0AV028/ 0BV028, cooling coils 0AE069/0BE069, and associated ductwork and damper housings shown on license renewal drawing LR-M-384 sheet 2, as components to be included in the scope of license renewal, or their exclusion needs to be justified. As discussed in the above system description, these components are part of the Control Room Air Conditioning Ventilation Supply System. The Control Room Air Conditioning Ventilation Supply System provides normal control room cooling, but is not required for control room habitability and does not have any safety related system intended functions. Therefore, these associated components are not within the scope of license renewal and are not subject to an AMR.

This Open Item lists return air fans 0AV029/ 0BV029, balance dampers at drawing zone F7 and G7, and associated ductwork and damper housings shown on license renewal drawing LR-M-384 sheet 3, as components to be included in the scope of license renewal, or their exclusion needs to be justified. As discussed in the above system description, these components are part of the CR Return Air System or the CR Toilet Exhaust System. These systems are not required for control room habitability and do not have any safety related system intended functions.

Therefore, these associated components are not within the scope of license renewal and are not subject to an AMR.

This Open Item requests the basis for the exclusion of supply roll filter 00F038 and bag filter 00F057. As discussed in the above system description, these components are part of the Control Room Air Conditioning Ventilation Supply System. The Control Room Air Conditioning Ventilation Supply System provides normal control room cooling, but is not required for control room habitability and does not have any safety related system intended functions. Therefore, these associated components are not within the scope of license renewal and are not subject to an AMR.

2.3.3.9.2-1

In RAI 2.3.3.9-1, the staff noted that LRA Table 2.3.3-9 does not list the heating coils and their housings 0AE073 and 0BE073 as being subject to an AMR, although these components are shown at locations F5 and C5 on license renewal drawing LR-M-399, sheet 1, as being within the scope of license renewal. The staff believes that these components provide a passive boundary function for the BESVS. Accordingly, the staff requested the applicant to provide its justification for the exclusion of the above components from Table 2.3.3-9 of the LRA. In a letter dated May 22, 2002, the applicant responded that the subject heating coils are steam heating coils that are installed inside the fan unit (0AV034, 0BV034) enclosure housing, and do not provide a passive boundary function for the BESVS. However, the fan enclosures (housings) are included in LRA Table 2.3.3-9.

The staff considers failure of a steam heating coil pressure boundary to cause steam leakage into the BESVS ventilation duct, thereby degrading HVAC unit performance. The staff believes that these heating coils do fall within the scope of license renewal and are subject to an AMR. **This is Open Item 2.3.3.9.2-1.**

Open Item 2.3.3.9.2-1 Resolution:

These heating coils (0AE073, 0BE073) have been included in the scope of license renewal ***and are subject to an AMR***. As indicated in the response to NSR/SR spatial interaction RAIs 2.1.2-3, 2.1.2-4, and 3.3-1 transmitted by Exelon letter dated May 21, 2002 (page 25 of 28), they are listed in the Auxiliary Steam System as heat exchanger (ventilation heater) components, which have been added to the scope of license renewal as a result of NSR/SR spatial relationship review.

10/22/02 Gave to Bob Pettis

Exelon

FAX

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Please provide this to the technical reviewer. If a call is necessary, I will be pleased to support it.

Confirmatory Item 3.0.4-1

The applicant also added a new section, Section A.1.17, "Corrective Action Program," which describes the three attributes of interest and addresses the staff's concern. The staff finds that the applicant's response to the RAI adequately addressed the staff guidance provided in the SRP-LR. With the applicant's commitment to include in the UFSAR Supplement a new section, Section A.1.17, that describes how the CAP would provide a description of how the attributes of corrective action, confirmation process, and administrative controls are met for the aging management programs the staff will be able to conclude that an adequate program summary has been provided in accordince with the requirements of 10 CFR 54.21(d). **This is Confirmatory Item 3.0.4-1.**

Response:

The Corrective Action Program is included in the UFSAR Supplement. It was renumbered from Section A.1.17 to Section A.1.13 in replacement of Standby Liquid Control System Surveillance Activities which was deleted as discussed is SER Section 3.3.4.2.2.

A.1.13 Corrective Action Program

The Corrective Action Program provides for evaluation of aging effects and significant operating events and requires that reasonable actions be taken to enhance programs and activities to prevent future occurrences. The plant condition reporting process applies to all plant structures, systems and components within the scope of license renewal. Corrective action is initiated following the identification of conditions adverse to quality. An effectiveness review is completed for all root cause analysis corrective actions to prevent recurrence and other items as assigned by the PBAPS Management Review Committee. If corrective actions to prevent recurrence are determined to be ineffective, this deficiency is addressed by the existing condition report or a new condition report is originated to address the deficiency and initiate resolution. Administrative controls are in place for existing aging management programs and activities and for the currently required portions of enhanced programs and activities. Administrative controls will also be applied to new and enhanced programs and activities as they are implemented. As a minimum, these programs and activities are or will be performed in accordance with written procedures. Those procedures are or will be reviewed and approved in accordance with PBAPS's 10CFR50, Appendix B, QA Program.

10/21/02 Gave to Doc, Pete, Paul

Exelon

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Here is the correct Table 3.6-2 that reflects the response to RAI 3.6-1 provided in our 4/29/02 letter. The earlier faxed info was based on our LRA, as submitted. I believe that this will ~~clarify~~ eliminate Duk's confusion caused by the earlier fax. If a call is needed, we can support it at 1:30 PM today.

Table 3.6-2 Aging Management Review Results for Connectors, Splices, and Terminal Blocks

Component Group	Component Intended Function	Environment	Materials of Construction	Aging Effect	Aging Management Activity
Electrical Connectors - Insulation	Electrical Continuity	Sheltered	Various organic insulation types (discussed in Section 2.5.1)	Loss of Material Properties	Non-EQ Accessible Cable Aging Management Activity (B.3.3)
Electrical Connectors - Metallic Connector	Electrical Continuity	Sheltered	Copper, tinned copper, and aluminum.	None (1)	Not Applicable.
Electrical Splices - Insulation	Electrical Continuity	Sheltered	Modified Polyolefin (XLPO, XLPE)	Loss of Material Properties	Non-EQ Accessible Cable Aging Management Activity (B.3.3)
Electrical Terminal Blocks (Fuse Clips/Holders)- Insulation	Electrical Continuity	Sheltered	Phenolic and nylon insulation	Loss of Material Properties	Non-EQ Accessible Cable Aging Management Activity (B.3.3)
Electrical Terminal Blocks (fuse Clips/Holders)- Metallic	Electrical Continuity	Sheltered	Copper, tinned copper, brass, bronze & aluminum	None (1)	Not Applicable

(1) No aging effect for PBAPS

2.2-1 The applicant proposed an aging management program, "Non-EQ Accessible Cable Aging Management Activity," for connectors, splices, and terminal blocks in a letter dated April 29, 2002. This program applies to electrical connectors, splices, and terminal blocks within the scope of license renewal that are installed in adverse localized environments caused by heat or radiation in the presence of oxygen. The staff found that the submitted aging management activity is essentially a visual inspection that addresses age-related degradation of connections that can result from exposure to high values of heat or radiation. In addition, fuse holders/blocks are classified as specialized type of terminal block because of the similarity in design and construction. Terminal blocks are passive components subject to an AMR for license renewal and so are fuse holders. During a conference call on September 5, 2002, the applicant stated that it will include fuse holders in the scope of the proposed AMP, Non-EQ accessible Cable Aging Management Activity (B.3.3), and this AMP will manage the aging effects for fuse connectors, splices, and terminal blocks as well as fuse holders. **This is Confirmatory Item 3.6.2.2.2-1.**

Response to confirmatory item 3.6.2.2.2-1

On May 16,2002, the NRC issued "Proposed Staff Guidance on the Identification and Treatment of Electrical Fuse Holders for License Renewal" to the industry for comment. The proposed staff position is that fuse holders (including fuse clips and fuse blocks) are considered to be passive electrical components and should be included in the aging management review (AMR) process. As indicated in the proposed guidance stated below, the staff position only applies to fuse holders that are not part of a larger assembly:

"However, fuse holders inside the enclosure of an active component, such as switchgear, power supplies, power inverters, battery chargers, and circuit boards, are considered to be piece parts of the larger assembly. Since piece parts and subcomponents in such an enclosure are inspected regularly and maintained as part of the plant's normal maintenance and surveillance activities, they are not subject to AMR."

Based on a conference call on 9/5/2002, and a clarification conference call on 9/23/2002, Exelon agrees with the above position that fuse holders are passive, long-lived electrical components within the scope of license renewal, and that only those fuse holders that are not part of a larger assembly are subject to an AMR. Exelon also agrees with the statement in the May 16, 2002 letter that, for the purpose of license renewal, fuse holders/blocks are classified as a specialized type of terminal block because of the similarity in design and construction.

Section 3.6.2, Table 3.6-2 of the License Renewal Application (LRA) provides the aging management review results for connectors, splices, and terminal blocks based on environment and material of construction. Since fuse holders/blocks are classified as a specialized type of terminal blocks because of similarity of design and material of construction, there are no additional aging effects requiring management.

Attached is the revised LRA Table 3.6-2.

10/21/02 Cover to Meena

Exelon

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Re: CI 3.0.3.3.2-1 CE 3.0.3.13.2-1 CI 3.0.3.19.2-1 State: PA

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Please share these with the technical reviews. If additional information is required, please arrange a conference call.

Confirmatory Item 3.0.3.3.2-1 In the May 14, 2002, response, the applicant also stated that the PBAPS closed cooling water chemistry activities are based on EPRI TR-107396. The EPRI guidelines define control parameters as those that assist with maintaining system chemistry control and define diagnostic parameters as those that assist with corrective actions if improvement in system control is required. As diagnostic parameters, the chlorides, fluorides, sulfates, nitrates, turbidity, and metals are trended. On August 6, 2002, via teleconference the staff requested additional information regarding the chloride and fluoride acceptance criteria. The applicant responded during the call that the acceptance criterion parameters for the chlorides and fluorides is < 10 ppm. The staff requests that the applicant confirm this information in writing.

Response:

For closed cooling water chemistry, the acceptable limit for chlorides and fluorides is < 10 ppm.

3.0.3.13.2-1 The staff requested that the applicant address the frequency of inspections of the ECW pump. During a teleconference on August 8, 2002, the applicant indicated that the ECW pumps are inspected every 10 years. **This is part of Confirmatory Item 3.0.3.13.2-1.** The additional part of this item is related to frequency of RWST Inspections and is discussed below.

The inspection of the RWST will be enhanced to periodically perform volumetric inspection of the bottom of the RWST for loss of material as a representative inspection to determine the condition of the underside of the CSTs. The staff requested that the applicant address the frequency of inspections of the RWSTs. During a teleconference on August 8, 2002, the applicant indicated that the RWSTS are inspected every 4 years. **This is the other part of Confirmatory Item 3.0.3.13.2-1.**

Confirmatory Item 3.0.3.13.2-1 Resolution:

The Emergency Cooling Water pump is inspected every 10 years.

The Refueling Water Storage Tank (RWST) is inspected every 4 years.

3.0.3.19.2-1 The applicant stated that the one-time piping inspection activities will be undertaken to provide reasonable assurance that there is no loss of material or cracking, as adequate for the system material and environment, that would result in loss of pressure boundary intended function of the piping. Qualified personnel following procedures consistent with the ASME Code will perform the nondestructive examinations. The staff requested the applicant to provide information regarding when this one-time inspection would occur. By teleconference call, on August 8, 2002, the applicant indicated that this one-time inspection will occur before the end of plant life, between the years 30 to 40. **This is a Confirmatory Item 3.0.3.19.2-1.**

Confirmatory Item 3.0.3.19.2-1 Resolution:

This one-time inspection will be implemented prior to the end of the initial operating license term for PBAPS. See the updated LRA Appendix A Section A.3.4, One-Time Piping Inspection Activities.

A.3.4 One-Time Piping Inspection Activities

The PBAPS one-time piping inspection activities will provide for identification of loss of material or cracking, as applicable for the system material and environment, by monitoring the condition of a representative sample of the piping at a susceptible location. The inspection activities will confirm the pressure integrity of the piping system. The scope and frequency of subsequent examinations will be based on the results of the initial inspection sample. These one-time piping inspection activities provide reasonable assurance that aging effects will be detected and addressed prior to loss of intended function. The one-time piping inspection activities will be implemented prior to the end of the initial operating license term for PBAPS.

3.6.2 Connectors, Splices, and Terminal Blocks

Table 3.6-2 Aging Management Review Results for Connectors, Splices, and Terminal Blocks

Component Group	Component Intended Function	Environment	Materials of Construction	Aging Effect	Aging Management Activity
Electrical Connectors - Insulation	• Electrical Continuity	Sheltered	Connector insulations bounded by Cables AMR discussed in Section 2.5.1	None (1)	• Not Applicable
Electrical Connectors - Metallic Connector	• Electrical Continuity	Sheltered	Copper, tinned copper, and aluminum.	None (2)	• Not Applicable.
Electrical Splices - Insulation	• Electrical Continuity	Sheltered	Modified Polyolefin (XLPO, XLPE)	None (1)	• Not Applicable
Electrical Terminal Blocks (Fuse clips/Fuse holders) - Insulation	• Electrical Continuity	Sheltered	Phenolic and nylon insulation	None (1)	• Not Applicable
Electrical Terminal Blocks (Fuse clips/Fuse holders)- Metallic	• Electrical Continuity	Sheltered	Copper, tinned copper, brass, bronze & aluminum	None (2)	• Not Applicable

(1) 60-year limiting service temperature greater than the bounding service temperature (design ambient temperature plus ohmic heating, as applicable.)
(2) No aging effects identified for PBAPS.

10/21/02 Gave to Greg & Meena/SFU

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Please share these with the technical reviewers. OI 2.3.3.18.2-1 was discussed with Greg Hatchett so we hope our response meets his expectations. If we need

2.3.3.18.2-1 In response to RAI 2.3.3.18-2, the applicant stated that the components identified by the staff are within the scope of license renewal and subject to an AMR. However, not all of the components are part of the cranes and hoists and thus not all are not listed in Table 2.3.3-18 of the LRA. Structural crane components such as bridge girders, trolley, trolley rails, crane rails, clips, and bolts are included in the component group listed in Table 2.3.3-18. Crane girders, columns, beams, base plates, and anchors are a part of the building structural steel and included in the structural steel component group listed in LRA Table 3.5-1, 3.5-2, 3.5-4, 3.5-5, 3.5-10, or 3.5-11. The applicant identified that the content of Table 2.3.3-18 is consistent with NUREG-1801, Section VII B, and the table on page VII B-3. The staff reviewed LRA Tables 3.5-1, 3.5-2, 3.5-4, 3.5-5, 3.5-10, and 3.5-11. In addition, the staff reviewed the Generic Aging Lessons Learned (GALL) Report, Section VII, Table VII B-3, to verify if the SSCs listed by the applicant in Table 2.3.3-18 as within scope are consistent with the GALL Report. On the basis of this review, the staff determined that the SSCs and their AMR results were included in the component groups in the tables identified by the applicant. However, the staff could not determine from the applicant's response how the SSCs in RAI 2.3.3.18-2 were captured within the scope of license renewal. The tables only provide the SSCs and the AMR results, but it is unclear to the staff how Section 2.3.3.18 uniquely identifies and lists these SSCs as being within the scope of license renewal. For example, the staff is unable to determine which of the component types listed in the structural steel component group in LRA Tables 2.4-1 and 3.5-1 captures the containment crane girder. **This is Open Item 2.3.3.18.2-1.**

Response to Open Item 2.3.3.18.2-1:

PBAPS has no containment crane or crane girder referenced as an example in the open item. Thus containment crane is not listed in the LRA Table 2.3.3-18, or in the list of cranes and hoists, in the scope of license renewal, we provided in response to RAI 2.3.3.18-1. Perhaps, the staff intended to use the reactor building crane and girder as an example since it is used to perform functions similar to those performed by PWR containment polar cranes.

Components for hoists located inside the containment, such as recirculation pump motor hoists, are included in "Other Cranes and Hoist" component group listed in Table 2.3.3-18, as clarified in response to RAI 2.3.3-18-1. The hoists are supported from steel components listed in Table 2.4-1 and platform steel listed in Table 2.4-15.

The staff issued RAI 2.3.3.18-2 indicating that it believes Table 2.3.3.18 is incomplete and requested information related to following components,

- Columns
- Baseplates and anchors for attachment to structures
- Structural crane components such as bridge girders, columns, trolley rails, baseplates and anchors for attachment to structures

In response to the RAI we indicated these components are in scope of license renewal and subject to AMR. We noted during our telephone discussion of October 15, 2002, that cranes and hoists at PBAPS are considered mechanical components while their supporting steel is considered part of the civil structural steel commodity groups. For this reason Table 2.3.3-18 includes only passive components of the crane itself and the rail system. Supporting steel such as columns, beams, base plates, and anchors to the structures, are included the structural steel listed in Tables 2.4-1, 2.4-2, 2.4-4, 2.4-5, 2.4-10, and 2.4-11. In some cases hoists are supported from platforms, in which case beams and other structural members supporting the hoist, are included in Miscellaneous Steel commodity group, Table 2.4-15.

To facilitate the staff review, we are providing a markup and reformatted copy of table 2.3.3-18 to list crane components/subcomponents questioned by the staff. We are also providing a markup of tables 2.4-1, 2.4-2, 2.4-4, 2.4-5, 2.4-10, 2.4-11, 2.4-15 (partial) to clarify what is included in the "Structural Steel" and "Platform" component groups. Clarification to the component groups is indicated in bold text.

Table 2.3.3-18 Component Groups Requiring Aging Management Review - Cranes and Hoists

Component Group	Component Intended Function	Environment
Circulating Water Pump Structure Crane 35-Ton Gantry • Structural Members • Trolley frames • Rail, rails clips, rail bolts	• Structural Support to Non-S/R Components	Outdoor
Reactor Building Overhead Bridge Cranes • Crane bridge girders • Trolley frames • Rails, rail clips, rail bolts	• Structural Support • Structural Support to Non-S/R Components	Sheltered
Other Cranes and Hoists • Crane bridge girders • Trolley frames • Monorail and hoist beams • Rails, rail clips, rail bolts	• Structural Support to Non-S/R Components	Sheltered

Table 2.4-1 Component Groups Requiring Aging Management Review - Containment Structure

Component Group	Component Intended Function	Environment
Structural Steel • Reactor Vessel Pedestal Steel • Sacrificial Shield Wall Steel **(includes columns, base plates, bolts, anchors, connection plates, welds, and other structural members)** • Sacrificial Shield Wall Stabilizer • Radial Beam Seats • Lubrite Plates	• Structural Support	Sheltered

Table 2.4-2 Component Groups Requiring Aging Management Review - Reactor Building Structure (Partial)

Component Group	Component Intended Function	Environment
Structural Steel • Structural Steel **(includes girders, crane runway girders, beams, columns, base plates, bolts, anchors, connection plate, welds, bracing and other structural members)** • Reinforced Concrete Embedments	• Structural Support • Structural Support to Non-S/R Components	Sheltered

Table 2.4-4 Component Groups Requiring Aging Management Review - Turbine Building and Main Control Room Complex

Component Group	Component Intended Function	Environment
Structural Steel • Structural Steel **(includes girders, crane runway girders, beams, columns, base plates, bolts, anchors, connection plate, welds, bracing and other structural members)** • Reinforced Concrete Embedments	• Structural Support • Structural Support to Non-S/R Components	Sheltered

Table 2.4-5 Component Groups Requiring Aging Management Review - Emergency Cooling Tower and Reservoir

Component Group	Component Intended Function	Environment
Structural Steel • Structural Steel **(includes beams, columns, base plates, bolts, anchors, connection plate, welds, bracing and other structural members)** • Reinforced Concrete Embedments	• Structural Support • Structural Support to Non-S/R Components	Sheltered

Table 2.4-10 Component Groups Requiring Aging Management Review - Diesel Generator Building

Component Group	Component Intended Function	Environment
Structural Steel • Structural Steel **(includes girders, beams, base plates, bolts, anchors)** • Reinforced Concrete Embedments	• Structural Support • Structural Support to Non-S/R Components	Sheltered

Table 2.4-11 Component Groups Requiring Aging Management Review - Circulating Water Pump Structure

Component Group	Component Intended Function	Environment
Structural Steel • Structural Steel **(includes girders, beams, columns, base plates, bolts, anchors, connection plate, welds, bracing and other structural members)** • Reinforced Concrete Embedments	• Structural Support • Structural Support to Non-S/R Components • Flood Barrier	Sheltered

Table 2.4-15 Component Groups Requiring Aging Management Review - Miscellaneous Steel

Component Group	Component Intended Function	Environment
Miscellaneous Steel • Platforms **(includes beams, columns, base plates, bolts, anchors, connection plate, welds, bracing and other structural members)** • Grating • Stairs • Ladders • Curbs (Steel) • Handrails • Kick Plates • Instrument Tubing Trays	• Structural Support • Structural Support to Non-S/R Components • Contain Fluid	Sheltered

Open Item 3.0.3.6.2-1

In response to RAIs B.1.8-1 and B.1.8-2, the applicant stated that the ISI program is not credited with managing the aging effects of ASME Code class piping in several plant systems, including HPCI, core spray, PCIS, RCIC, and RHR. Instead, the applicant stated the aging was adequately managed by Reactor Coolant System Chemistry (B.1.2), Condensate Storage Tank Chemistry Activities (B.1.4), Closed Cooling Water Chemistry (B.1.3), or Torus Water Chemistry Activities (B.1.5), as applicable. These programs provides chemistry controls only and do not include provisions for any inspections to verify the effectiveness of the programs. Water chemistry programs are designed to mitigate aging effects and not designed to confirm that the aging effect has not occurred. Confirmation of the effectiveness of chemistry programs is needed because they may not be effective in managing aging effect particularly in low or stagnant flow areas and lead to unacceptable degradation. Therefore, it is the staff's position that the applicant should perform inspections, through either the ISI program or one-time inspections, which are credited for license renewal, to verify the effectiveness of the chemistry program credited for managing the effects of aging.

Open Item 3.0.3.6.2-1 response:

In order to verify the effectiveness of the chemistry program, inspections performed as part of the ISI Program for ASME Class 2 piping in the HPCI, RCIC, RHR, and Core Spray systems will be credited for PBAPS license renewal aging management. PCIS (RWCU) is not included here because it is ASME Class 1 piping and is already included in the ISI program in the LRA.

10/25/02

⇨ P'3-12 & 3-125 need to revise these pages

- for FP they committed to do sample inspection 3-64 ⊙ 3-65 (2nd inspection)
+ last year they dug up FP piping & found it to be in good shape ⊙
op experience where they excavation service water piping & found in good conditions ⊙

10/18/02 Gave to Barry.

Exelon

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Please share this with Barry. If a discussion is needed, we will be pleased to support a call.

Open Item 4.5.2-1: The staff is concerned that multiple failures of top guide beams are possible when the threshold fluence for IASCC is exceeded. According to BWRVIP-26, multiple cracks have been observed in top guide beams at Oyster Creek. In addition, baffle-former bolts on PWRs that exceeded the threshold fluence have had multiple failures. In order to exclude the top guide beam from inspection when its fluence exceeds the threshold value, the applicant must demonstrate that failures of multiple beams (all beams that exceed the threshold fluence) will not impact the safe shutdown of the reactor during normal, upset, emergency, and faulted conditions. If this can not be demonstrated, the applicant should propose an aging management program (AMP) for these components which contain the elements in Branch Technical Position RLSB-1 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," July 2001.

Response to Open Item 4.5.2-1: In developing inspection recommendations for the top guide (and all other internal components), the BWRVIP first evaluated whether the failure of a particular location (e.g., weld, bolted connection, etc.) could cause degradation in plant safety. If the failure affects the ability of the plant to safely shutdown, an inspection of that location is required. If there are no failure consequences, then no inspections are required for that component. This strategy is adequate to ensure plant safety and has been accepted by the staff for core internals evaluated by BWRVIP.

BWRVIP-06, "Safety Assessment of BWR Reactor Internals", section 2.1.3.2 provides the following information for the top guide locations:

Location 1 – Grid beam-to-beam crevice slot
Location 4 – Grid beam to rim top and bottom cover plate pins
Location 6 – Fuel guard welds and bolting

No safety consequences result from failures at location 1, 4, and 6. Grid beams are inter-tied in such a manner that a large number of complete separations by cracking would need to be postulated before control rod insertion would be hindered. Crack indications have only been observed at one domestic reactor (Oyster Creek). However, failures at creviced connections at beam intersections and at mid-span locations have the same safety consequences. Multiple failures in a lower beam could cause a piece to fall to the core plate, possibly damaging in-core instrumentation, but this would not interfere with control rod insertion. Failure of all the rim pins would not result in movement of the grid of beams because the rim and the cover plates will restrain the ends of the beams without the pins.

The top guide is visually observable during each refueling outage. Therefore, even though there is no safety consequence, cracking resulting in beam separation could be detected.

Locations 2 and 3 – Aligner pins and sockets in top guide and shroud

Analyses have shown that degradation of control rod insertion does not occur until the extent of cracking is sufficient to result in a sustained movement of the top guide by more than 2.5 inches. The "egg-crate" design of the top guide and the close packing of the fuel assemblies provides substantial redundancy to resist local movement.

Therefore potential movement would occur only if the entire core were repositioned. Table 3-2, Matrix of Inspection Options, provides a summary of options at each location. Peach Bottom is a BWR/4 without wedges for locations 2,3. As per the Table, a plant specific analyses was performed that indicates the amount of weld needed to resist the seismic load. This number is less than 20%. Therefore, as identified in the Table, under plant-specific analyses, if less than 20% of the weld is required, no inspection is needed. Moreover, reactivity control would also be achieved by operator initiation of SLC system in accordance with the EPG's.

10/15/02 Gave to Dave

Exelon

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10/18/02 Gave to Billy

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OI 3.0.3.20.3-1

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Please share these with the technical reviewers. If additional information is required, please arrange a conference call.

3.0.3.20.3-1 The applicant describes the reactor materials surveillance program as an existing program in Section A1.12 of the LRA. The program uses periodic testing of metallurgical surveillance samples to monitor the loss of fracture toughness of the reactor pressure vessel beltline region materials consistent with the requirements of 10 CFR Part 50, Appendix H, and ASTM E185. The applicant does not include a summary of the BWR Integrated Surveillance Program, which it intends to use at Peach Bottom. In RAI 3.1-17, the staff requested the applicant to include information about the BWR Integrated Surveillance Program, which should include reference to BWRVIP reports. In response to this RAI, the applicant stated that Section A.1.12 description has been revised to include information about the BWR Integrated Surveillance Program, which is one alternative that may be used at PBAPS to comply with 10 CFR Part 50, Appendix H. **This is Confirmatory Item 3.0.3.20.3-1.**

Response to Confirmatory Item 3.0.3.20.3-1

Section A.1.12 has been revised as shown in the UFSAR Supplement.

A.1.12 Reactor Materials Surveillance Program

The PBAPS Reactor Materials Surveillance (RMS) program manages loss of fracture toughness in the reactor pressure vessel beltline region consistent with the requirements of 10 CFR 50, Appendix H and ASTM E185. Compliance with 10CFR50, Appendix H may be demonstrated either through an NRC approved site-specific program or an integrated surveillance program that meets the technical requirements documented within BWRVIP-78. The RMS program provides for periodic withdrawal and testing of in-vessel capsules to monitor the effects of neutron embrittlement on the reactor vessel beltline materials. The results of this testing are used to determine plant operating limits. The RMS program contains sufficient dosimetry and materials to monitor irradiation embrittlement during the period of extended operation and provides reasonable assurance that aging effects are detected and addressed prior to loss of intended function.

will

3.6.1.2.2-1 However, to be consistent with the commitment made in response to RAI 3.6-1, the applicant needs to provide a summary of description of the B.3.3, "Non-EQ accessible cable aging management activity" in the UFSAR Supplement. **This is Confirmatory Item 3.6.1.2.2-1.**

Response to confirmatory item 3.6.1.2.2-1

A.3.3 Non-EQ Accessible Cable Aging Management Activity

The Non-EQ accessible cable aging management activity will visually inspect all cables and connections in accessible areas (easily approached and viewed) in the potential adverse localized environment. The Non-EQ accessible cable aging management activity will be performed once every ten years, beginning prior to the period of extended operation. This inspection activity will provide reasonable assurance that the intended functions of electrical cables and connections that are not subject to the environmental qualification requirements of 10 CFR 50.49 and are exposed to adverse localized environments caused by heat or radiation will be maintained consistent with the current licensing basis through the period of extended operation.

.2.2-1 The applicant proposed an aging management program, "Non-EQ Accessible Cable Aging Management Activity," for connectors, splices, and terminal blocks in a letter dated April 29, 2002. This program applies to electrical connectors, splices, and terminal blocks within the scope of license renewal that are installed in adverse localized environments caused by heat or radiation in the presence of oxygen. The staff found that the submitted aging management activity is essentially a visual inspection that addresses age-related degradation of connections that can result from exposure to high values of heat or radiation. In addition, fuse holders/blocks are classified as specialized type of terminal block because of the similarity in design and construction. Terminal blocks are passive components subject to an AMR for license renewal and so are fuse holders. During a conference call on September 5, 2002, the applicant stated that it will include fuse holders in the scope of the proposed AMP, Non-EQ accessible Cable Aging Management Activity (B.3.3), and this AMP will manage the aging effects for fuse connectors, splices, and terminal blocks as well as fuse holders. **This is Confirmatory Item 3.6.2.2.2-1.**

Response to confirmatory item 3.6.2.2.2-1

On May 16,2002, the NRC issued "Proposed Staff Guidance on the Identification and Treatment of Electrical Fuse Holders for License Renewal" to the industry for comment. The proposed staff position is that fuse holders (including fuse clips and fuse blocks) are considered to be passive electrical components and should be included in the aging management review (AMR) process. As indicated in the proposed guidance stated below, the staff position only applies to fuse holders that are not part of a larger assembly:

"However, fuse holders inside the enclosure of an active component, such as switchgear, power supplies, power inverters, battery chargers, and circuit boards, are considered to be piece parts of the larger assembly. Since piece parts and subcomponents in such an enclosure are inspected regularly and maintained as part of the plant's normal maintenance and surveillance activities, they are not subject to AMR."

Based on a conference call on 9/5/2002, and a clarification conference call on 9/23/2002, Exelon agrees with the above position that fuse holders are passive, long-lived electrical components within the scope of license renewal, and that only those fuse holders that are not part of a larger assembly are subject to an AMR. Exelon also agrees with the statement in the May 16, 2002 letter that, for the purpose of license renewal, fuse holders/blocks are classified as a specialized type of terminal block because of the similarity in design and construction.

Section 3.6.2, Table 3.6-2 of the License Renewal Application (LRA) provides the aging management review results for connectors, splices, and terminal blocks based on environment and material of construction. Since fuse holders/blocks are classified as a specialized type of terminal blocks because of similarity of design and material of construction, there are no additional aging effects requiring management.

Attached is the revised LRA Table 3.6-2.

10/15/02 Gave to Sylo B.

Exelon

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tubes that are exposed to raw water. The cooling coil tubesheets and frames are fabricated from galvanized carbon steel, the cooling coil fins are fabricated from aluminum, and the cooling coil tubes are fabricated from copper. The fins, frames, and tubesheets are exposed to sheltered air conditions and the copper tubes are exposed to raw water internally and sheltered air externally. In Tables 3.2-2 and 3.2-5 of the application, the applicant provided its corresponding AMRs for the CS and RHR pump room cooling coil components and identified cracking, loss of material, flow blockage, and heat transfer reduction function as applicable effects for the surfaces of the RHR pump room cooling coil tubes that are exposed to raw water and heat transfer reduction function as an applicable aging effect for the RHR pump room coiling coil fins, tubes, tubesheets, and frames that are exposed to sheltered air. Table 3.2-1 of NUREG-1800 identifies biofouling and corrosion products (crud) as applicable to ESF heat exchanger tubes that are exposed to raw water sources. These mechanisms can lead to a loss of heat transfer function in these tubes. The applicant is required under the environmental qualification (EQ) requirements of 10 CFR 50.49 to assure the operability of safety-related electrical components by qualifying the components as capable of operating during the worst-case environmental conditions postulated to occur during a design basis accident. The applicant has performed an EQ analysis of both the HPCI and the RCIC pump rooms for the environmental conditions that are postulated to occur during a postulated design basis accident for the plants and has determined that the HPCI and RCIC pump room cooling coils are not required to maintain the operability of the HPCI and RCIC systems during these events. This provides an acceptable technical basis for concluding that reduction in heat transfer function is not an applicable effect for either the HPCI or the RCIC pump room cooling coil tubes that are exposed to raw water. The staff therefore concludes that the applicant's identification of aging effects for the HPCI and RCIC pump room cooling coil components under liquid conditions is acceptable.

Based on the technical considerations discussed in the previous paragraphs, the staff concludes that the applicant's identification of aging effects for the HPCI gland seal coolers, HPCI lube oil coolers, and HPCI and RCIC pump room coolers is acceptable.

HPCI also includes flex hoses made from neoprene or rubber. The applicant has identified loss of material properties as an applicable aging effect for HPCI flex hoses that are fabricated from neoprene or rubber and that are exposed to lubricating oil. Neoprene, an elastomer, is a form of rubber. Elastomers and rubber lose their elastic properties (thermally age or harden) over time. Radiation, ionic or organic impurities, and heat may accelerate the process. The staff therefore concurs that loss of material properties is an applicable effect for the HPCI ESF components made from neoprene and rubber and concludes that the applicant's identification of aging effects for the HPCI neoprene materials is acceptable.

Aging Effects for the Surfaces of HPCI Components Exposed to Gas Environments

In Table 3.2-1 of the LRA, the applicant lists the steam, wetted gas, ventilation air, and sheltered environments as the gas environments to which the HPCI components may be exposed. The applicant identified the following aging effects as applicable to the HPCI

3.2.1.2.2 Aging Management Programs

The applicant identified the following AMPs and activities to manage the above aging effects for the HPCI components:

- The applicant has credited the demineralized water and condensate storage tank chemistry activities (LRA B.1.4) to manage loss of material, cracking, or reduction in heat transfer in stainless steel, carbon steel, and copper alloys in piping, valves, and heat exchangers. The staff evaluates these activities in Section 3.0.3.4 of this SER.

- The applicant has credited the reactor coolant system chemistry activities (LRA B.1.2) to manage loss of material and cracking in stainless steel, carbon steel, and copper alloys in piping, valves, and heat exchangers. The staff evaluates these activities in Section 3.0.3.2 of this SER.

- The applicant has credited the (ISI) program (LRA B.1.8) to manage loss of material and cracking in stainless steel, carbon steel, and copper in piping, valves, and heat exchangers. The staff evaluates these activities in Section 3.0.3.6 of this SER.

- The applicant has credited the torus water chemistry activities (LRA B.1.5) to manage loss of material and cracking in stainless steel and carbon steel in piping and valves. The staff evaluates these activities in Section 3.0.3.5 of this SER.

- The applicant has credited the torus piping inspection activities (LRA B.3.1) to manage loss of material in carbon steel in piping, pipe steam traps, and valves. The staff evaluates these activities in Section 3.0.3.21 of this SER.

- The applicant has credited the heat exchanger inspection activities (LRA B.2.12) to manage cracking, loss of material, and reduction in heat transfer in copper alloys and carbon steel in heat exchangers. The staff evaluates these activities in Section 3.0.3.17 of this SER.

- The applicant has credited the lubricating and fuel oil quality testing activities (LRA B.2.1) to manage loss of material, cracking, and heat transfer reduction in carbon steel, cast iron, copper alloys, stainless steel, brass alloys, and brass in valves, pump casings, heat exchangers, and lubricating oil tanks. The staff evaluates these activities in Section 3.0.3.18 of this SER.

- The applicant has credited the HPCI and RCIC turbine inspection activities (LRA B.2.10) to manage loss of material in carbon steel turbine casing and lubricating oil tanks, ~~and loss of properties in neoprene and rubber in flex hoses~~. The staff evaluates these activities in the following paragraphs.

HPCI and RCIC Turbine Inspection Activities

The applicant described the HPCI and RCIC turbine inspection activities in Section B.2.10 of the LRA. This program provides aging management of the HPCI and RCIC turbine casings exposed to a wetted gas environment. The applicant stated that the HPCI turbine inspection activities additionally provide for condition monitoring of components exposed to a lubricating oil

- loss of material and cracking of stainless steel RCIC components that are exposed to steam

The staff's evaluation of the applicant's identification of aging effects for the RCIC components that are exposed to steam, wetted gas and sheltered air environments is consistent with the staff's analysis in Section 3.2.1.2.1 for similar HPCI components that are exposed to these environments. Based on the staff's evaluation in Section 3.2.1.2.1 of this SER, the staff concludes that the applicant's identification of aging effects for the RCIC components that are exposed to gaseous environments is conservative and is therefore acceptable.

3.2.4.2.2 Aging Management Programs

The applicant identified the following AMPs and activities to manage the above aging effects for the RCIC components:

- The applicant has credited the demineralized water and condensate storage tank chemistry activities (LRA B.1.4) to manage loss of material, cracking, or reduction in heat transfer in stainless steel, carbon steel, and copper alloys in piping, valves, and heat exchangers. The staff evaluates these activities in Section 3.0.3.4 of this SER.

- The applicant has credited the reactor coolant system chemistry activities (LRA B.1.2) to manage loss of material and cracking in stainless steel, carbon steel, and copper alloys in piping, valves, and heat exchangers. The staff evaluates these activities in Section 3.0.3.2 of this SER.

- The applicant has credited the (ISI) program (LRA B.1.8) to manage loss of material and cracking in stainless steel, carbon steel, and copper in piping, valves, and heat exchangers. The staff evaluates these activities in Section 3.0.3.6 of this SER.

- The applicant has credited the torus water chemistry activities (LRA B.1.5) to manage loss of material and cracking in stainless steel and carbon steel in piping and valves. The staff evaluates these activities in Section 3.0.3.5 of this SER.

- The applicant has credited the torus piping inspection activities (LRA B.3.1) to manage loss of material in carbon steel in piping, pipe steam traps, and valves. The staff evaluates these activities in Section 3.0.3.21 of this SER.

- The applicant has credited the heat exchanger inspection activities (LRA B.2.12) to manage cracking, loss of material, and reduction in heat transfer in copper alloys and carbon steel in heat exchangers. The staff evaluates these activities in Section 3.0.3.17 of this SER.

- The applicant has credited the HPCI and RCIC turbine inspection activities (LRA B.2.10) to manage loss of material in ~~carbon~~ low-alloy steel turbine casing~~, and lubricating oil tanks and change in properties of neoprene and rubber in flex hoses~~. The staff evaluates these activities in Section 3.2.1.2.2.1 of this SER.

- The applicant has credited the lubricating and fuel oil quality testing activities (LRA B.2.1) to manage loss of material, cracking, and heat transfer reduction in carbon steel,

SER Open Item 3.0.3.16.2-1 Resolution

The maintenance activity will be enhanced to include a visual inspection of the flexible hoses for aging effects of change in material properties such as cracking, swelling and hardening. (B.2.9 element 4)
The maintenance activity is scheduled annually. (B.2.9 element 5)

Confirmatory Item 3.2.1.2.2-1

Program Scope: The applicant described the program scope of the HPCI and RCIC turbine inspection activities as focusing on managing loss of material and change in material properties by the performance of periodic inspections of the turbine casings and HPCI lubricating oil system tank internals and flexible hoses. In LRA Table 3.2-1(aging management results for RCIC system), the HPCI and RCIC turbine inspection activities AMP is listed as the aging management program for lubricating oil tanks with lubricating oil as the applicable environment. Wetted gas environment is also in the program scope of the AMP. Therefore, the staff requested the applicant to identify the reference to the AMP being applied to components in a wetted gas environment. By letter dated April 29, 2002, the applicant responded that LRA Table 3.2-1 identifies a number of carbon steel and stainless steel components in a wetted gas environment. For carbon steel components in a wetted gas environment, the applicable aging management activity is referenced in the table. The aging management review has determined that the stainless steel components in the HPCI system (LRA Table 3.2-1) that are exposed to an internal environment of wetted gas do not have any aging effects that require aging management. The applicant stated that therefore no aging management activity is identified for these components in Table 3.2-1. The staff found the scope of the program to be acceptable because the LRA and the additional information provided to the staff the have adequately addressed the components whose aging effects can be managed by the application of the HPCI and RCIC turbine inspection activities. The staff notes that during a conference call on August 21, 2002, the applicant stated the flexible hoses were stainless steel rather than an elastomer of neoprene and rubber. In a call and electronic mail on September 6, 2002, the applicant stated that the stainless steel flexible hose was a gland seal bleed-off line subjected to a wetted gas internal environment and a sheltered air external environment (see LRA Table 3.2-1, page 3-24 third row titled "Elastomer Flex Hoses") and do not require aging management. Therefore, the flexible hoses would not be covered by this program. The staff finds this acceptable because the stainless steel hoses subject to a wetted gas and sheltered environment do not require aging management. The applicant needs to confirm this information in writing. **This is part of Confirmatory Item 3.2.1.2.2-1.** The additional parts of this confirmatory item are discussed below in the parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria program elements.

Confirmatory Item 3.2.1.2.2-1 Resolution

The LRA Table 3.2-1 incorrectly identified the flexible hoses on the HPCI system as an elastomer made of neoprene and rubber. In fact, the material of construction is stainless steel. There are 2 internal environments for the flexible hoses, wetted gas and lubricating oil. Both of these have an external sheltered environment.

In addition, the RCIC system also has stainless steel flexible hoses in the wetted gas and sheltered environments. This should have been included in Table 3.2-4 of the LRA.

The aging management review determined that there are no aging effects requiring management for stainless steel in the wetted gas and sheltered environments. For stainless steel in an oil environment, the aging effect of loss of material is managed by the Lubricating and Fuel Oil Quality Testing Activity B.2.1.

Therefore, the AMP A.2.10 and B.2.10 for HPCI and RCIC Turbine Inspection Activities are revised to delete the inspections of the flexible hoses:

A.2.10 HPCI and RCIC Turbine Inspection Activities

The HPCI and RCIC turbine inspection activities provide for aging management of the HPCI and RCIC turbine casings that are exposed to a wetted gas environment. The HPCI turbine inspection activities additionally provide for condition monitoring of components exposed to a lubricating oil environment. The inspection activities perform assessments of components for loss of material aging effects. ~~The activities will be enhanced to inspect the HPCI lubricating oil system flexible hoses for a change in material properties.~~ The HPCI and the RCIC turbine inspection activities are performed periodically in connection with turbine maintenance. The HPCI and RCIC turbine inspection activities provide reasonable assurance that aging effects will be detected and addressed prior to loss of intended function. ~~Activity enhancements will be implemented prior to the end of the initial operating license term for PBAPS.~~

B.2.10 HPCI and RCIC Turbine Inspection Activities

ACTIVITY DESCRIPTION

The HPCI and RCIC turbine inspection activities provide for aging management of the HPCI and RCIC turbine casings that are exposed to a wetted gas environment. The HPCI turbine inspection activities additionally provide for condition monitoring of components exposed to a lubricating oil environment. The inspection activities perform assessments of components for loss of material aging effects. ~~A PBAPS procedure will be enhanced to inspect the HPCI lubricating oil system flexible hoses for a change in material properties.~~ The HPCI and the RCIC turbine inspection activities are performed periodically in connection with turbine maintenance in accordance with plant procedures.

EVALUATION AND TECHNICAL BASIS

(1) Scope of Activity: The HPCI and RCIC turbine inspection activities focus on managing loss of material and change in material properties aging effects by the performance of periodic inspections of the turbine casings and HPCI lubricating oil system tank internals ~~and flexible hoses~~.

(2) Preventive Actions: The HPCI and RCIC turbine inspection activities provide inspection methods to identify aging effects. There are no preventive or mitigating attributes associated with these activities.

(3) Parameters Monitored/Inspected: The HPCI and RCIC turbine inspection activities consist of visual inspections of the turbine casings and the HPCI lubricating oil tank internals for evidence

of loss of material. ~~These activities will also be enhanced to inspect the HPCI lubricating oil system flexible hoses for a change in material properties.~~

(4) Detection of Aging Effects: Visual inspections for evidence of loss of material are conducted in accordance with an existing PBAPS procedure. ~~This procedure will be enhanced to perform a visual inspection of HPCI lubricating oil system flexible hoses for a change in material properties.~~ Loss of material ~~and change in material properties~~ aging effects are identified and corrected prior to a loss of intended function.

(5) Monitoring and Trending: Visual examinations are conducted on a periodic basis. The examinations monitor the turbine casings, and HPCI lubricating oil storage tank~~, and HPCI lubricating oil system flexible hoses~~ for evidence of aging degradation.

(6) Acceptance Criteria: Examinations for pitting of turbine casings are conducted in accordance with approved PBAPS procedures. Engineering evaluations of identified turbine casing pitting are performed and appropriate corrective actions determined. ~~Flexible hoses will be examined in accordance with approved PBAPS procedures and replaced when abnormal conditions are identified.~~ The results of the examinations are documented.

HPCI lubricating oil tank internals are inspected for corrosion and scaling. Engineering evaluations of identified loss of material are performed and appropriate corrective actions determined.

(7) Corrective Actions: Identified deviations are evaluated within the PBAPS corrective action process which includes provisions for root cause determinations and corrective actions to prevent recurrence as dictated by the significance of the deviation.

(8) Confirmation Process: The PBAPS corrective action process includes:

- Reviews to assure that proposed actions are adequate;
- Tracking and reporting of open corrective actions; and
- For root cause determinations, reviews of corrective action effectiveness.

(9) Administrative Controls: All credited aging management activities are subject to administrative controls, which require formal reviews and approvals.

(10) Operating Experience: A review of the operating experience for PBAPS found that there have been no aging related turbine casing failures resulting in a loss of intended function of the HPCI or RCIC turbines. Minor HPCI lubricating oil system leakage events have been detected and corrected in a timely manner. There have been no HPCI lubricating oil age related component failures resulting in a loss of function.

SUMMARY

The HPCI and RCIC turbine inspection activities consist of visual inspections of the turbine casings and the HPCI lubricating oil tank internals for evidence of loss of material~~, and will be enhanced to inspect the HPCI lubricating oil system flexible hoses for a change in material properties~~. Based on PBAPS operating experience, there is reasonable assurance that the HPCI and RCIC turbine inspection activities will adequately manage the identified aging effects for the components so that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

REFERENCES

None

10/10 Gave to Meena

Exelon

FAX

To: DAVE SOLORIO	From: JERRY PHILLABAUM
Fax: (301) 415-2279	Street: 200 Exelon Way, KSA [redacted] 1-N-3
Phone: (301) 415-1973	City: Kennett Square
Re: Confirmatory Item 3.0.3.17.2-1	State: PA
Pages: 2	Zip: 19348
CC:	Phone:
Date: 10/7/02	Fax: 610-765-[redacted]5640

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Please share our proposed response. Page 3-72 is provided to highlight a necessary change. Please arrange a teleconference if additional information is required.

stated that part of the evaluation may include NDE examinations, as warranted. The staff found the description of the detection of aging effects reasonable and therefore acceptable.

Monitoring and Trending: The applicant stated that the periodic component visual inspections and cleaning are conducted as part of HPCI and RCIC turbine inspections, and provide for timely detection of loss of material, cracking, and heat transfer reduction prior to loss of intended function. Section A.1.2.3.5 of NUREG-1800 states that it is necessary to confirm that the next scheduled inspection will occur before a loss of SC intended function. Therefore, the staff requested additional information from the applicant concerning the schedule for the periodic component visual inspections and cleaning as part of the HPCI and RCIC turbine inspections and the justification for the inspection interval.

The applicant responded, in a letter to the NRC dated May 14, 2002, that the HPCI and RCIC turbine maintenance is performed every 8 years and this frequency is based on plant-specific operating and maintenance experience with the HPCI and RCIC turbines. The component inspections are scheduled as part of the turbine maintenance. The staff found the applicant's approach to monitoring activities to be acceptable because it is based on methods that are sufficient to predict the extent of degradation so that timely corrective or mitigative actions are possible.

Acceptance Criteria: Engineering evaluations of identified aging degradation, including loss of material, cracking, flow blockage, and loss of heat transfer aging effects, are used to confirm the ability of the component to perform its intended functions. Visual inspections of each of the subject heat exchangers are conducted by the applicant to detect fouling. If any type of degradation is found, the applicant takes further action via its corrective action program. The staff requested clarification regarding inspection procedures used to determine acceptability of the heat exchanger tubes. During a teleconference on August 6, 2002, the applicant indicated that the subject heat exchangers are very small heat exchangers and that all tubes are ~~fully disassembled~~ throughly cleaned and visually inspected. In addition, the applicant sited various inspection procedures that are used. **This is the other part of Confirmatory Item 3.0.3.17.2-1.**

The staff requested additional information from the applicant concerning the acceptance criteria for fouling management and whether the acceptance criteria include effective cleaning of fouling by organisms and maintenance of the coating or lining. The applicant responded, in a letter to the NRC dated May 14, 2002, that during maintenance, the tubes are cleaned and verification of effectiveness is accomplished by the turbine operability surveillance test. The applicant stated that these components do not have a coating or lining. The staff found the acceptance criteria specified by the applicant to ensure the intended functions of the SSCs which are inspected as a result of the heat exchanger inspection activities is adequate.

Operating Experience: The applicant stated that the heat exchanger inspection activities implement inspection and cleaning of heat exchangers. The applicant concluded that the PBAPS operating experience review identified no loss of pressure boundary integrity or heat transfer capability for these components as a result of aging degradation. The staff concludes that the aging management activities described above are based on plant experience. The staff agreed that these activities are effective at maintaining the intended function of the

Confirmatory Item 3.0.3.17.2-1

The HPCI Gland Seal Condensers and Lube Oil Coolers tubes are inspected for loss of material, cracking, and fouling during the routine preventive maintenance activities. The HPCI and RCIC lube oil cooler tubes are all cleaned. Cleaning is performed as required on the Gland Seal Condenser.
The individual tubes are not disassembled. The head of the heat exchanger is removed to allow access to the tubes and tubesheet on the water side of the heat exchangers.

10/10 Gave to Meena K. Exelon

FAX @1:

To: DAVE SOLORIO From: JERRY PHILLABAUM

Fax: (301) 415-2279 Street: 200 Exelon Way, KSA [redacted] 1-N-3

Phone: (301) 415-1973 City: Kennett Square

Re: SER Page 3-75 State: PA

Pages: Zip: 19348

CC: Phone:

Date: 10/7/02 Fax: 610-765-[redacted]5640

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Sampling of the bottom of the diesel-driven fire pump fuel oil storage tank proved to be more difficult than originally thought. The original inspection location for entry into the tank did not work. Because of the extent of disassembly required to perform sampling on the bottom of tank, the frequency is changed from 92 days to 1 year. Please arrange a call if this needs discussion.

Periodic cleaning of oil tanks is performed as part of the emergency diesel generator inspection activities (as discussed in Section B.2.4 of the LRA). The emergency diesel generator fuel oil storage tanks are drained and cleaned every 10 years. Residual fuel oil and sludge is removed, and the tank is washed with a cleaning solution and finally wiped until clean and dry. Tank wall thickness measurements are also taken, with no loss of wall thickness identified to date. The emergency diesel generator day tanks are periodically drained and the interiors of the tanks are visually inspected.

The HPCI lubricating oil storage tank is periodically drained, cleaned, and inspected as part of the HPCI turbine maintenance. This activity is performed as part of the HPCI and RCIC turbine inspection activities (as discussed in Section B.2.10 of the LRA). The bottom of the diesel-driven fire pump fuel oil storage tank is sampled for water ~~every 92 days~~ annually. This tank is located indoors in a sheltered environment, so there are no significant aging effects at the tank external surfaces. Frequent oil sampling precludes significant accumulation of water inside the tank. The oil sampling for the presence of water and contaminants is an adequate activity for managing loss of material of the carbon steel tank in a fuel oil environment.

Different than annual water sampling?

The sampling activities of the diesel-driven fire pump fuel tanks are intended to detect accumulation of water and contaminants and thereby preclude corrosion within the tanks, similar to the emergency diesel generator fuel oil tanks sample activities. The four EDG fuel oil storage tanks, four EDG fuel oil day tanks, diesel fire pump fuel oil storage tank, and diesel fire pump fuel oil day tank are all constructed of carbon steel. The EDG fuel oil storage tanks are buried tanks, while the EDG fuel oil day tanks, diesel fire pump fuel oil storage tank, and diesel fire pump fuel oil day tank are located in a sheltered indoor environment. Since the buried environment is considered more aggressive than the sheltered environment, the EDG fuel oil storage tanks are considered to be the most bounding for these carbon steel fuel oil tanks. The applicant stated that if the EDG fuel oil storage tank inspections and wall measurements indicate significant deterioration and/or significant wall thinning, the condition will be documented in a condition report and the cause of the degradation will be determined. Generic implications for similar storage tanks would be considered and additional inspections performed as adequate.

On the basis of this review and the above additional information provided by the applicant, the staff found these activities adequate to mitigate aging degradation for components exposed to lubricating oil or fuel oil.

Parameters Monitored or Inspected: The applicant described lubricating oil sample analyses to be performed periodically in accordance with an approved PBAPS procedure. The applicant stated that samples are analyzed for attributes such as viscosity, moisture content, and pH. Samples of new fuel oil deliveries are analyzed for water and sediment. Emergency diesel generator and diesel-driven fire pump fuel oil storage tank samples are also periodically analyzed for the presence of water and the particulate content of the fuel. Enhancements to the diesel-driven fire pump fuel oil sampling techniques will be made to improve the methods for detection of water in the fuel. The applicant further stated that sampling activities for water that may be detected in the EDG and diesel-driven fire pump fuel oil systems would be enhanced to include an analysis for microbes. The staff found the description of the parameters monitored or inspected adequate to mitigate aging degradation for components exposed to lubricating oil or fuel oil because of the approved plant procedures and the additional enhancement activities.

10/10 Gave to Stz

Exelon

FAX

To: DAVE SOLORIO	From: JERRY PHILABAUM
Fax: (301) 415-2279	Street: 200 Exelon Way, KSA [redacted] 1-N-7
Phone: (301) 415-1973	City: Kennett Square
Re: Door Inspection Activities	State: PA
Pages: 1	Zip: 19348
CC:	Phone:
Date: 10/4/02	Fax: 610-765-[redacted]5640

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

Please see page 3-57 mark-up. Doors are not in the Maintenance Rule Structural Monitoring Program. As correctly quoted, the frequency of inspection is consistent with the frequency of inspection per LRA program B.1.16.

The effectiveness of the program in detecting the aging effects depends upon the frequency of inspections. RAI B.2.6-4 requested this information. The applicant provided the following response in letter dated April 29, 2002:

> Door inspection activities are performed on a frequency of 4 years or less. The frequency is consistent with the frequency of PBAPS Maintenance Rule Structural Monitoring Program (B.1.16) and industry practices for implementing the requirements of 10 CFR 50.65 for structures. The frequency is selected to ensure, with reasonable assurance, that aging degradation of hazard barrier doors will be detected before there is a loss of intended functions."

The staff finds the response adequate because the PBAPS Maintenance Rule Structural Monitoring Program ~~will monitor the condition of hazard barrier doors~~ condition of hazard barrier doors will be monitored on a frequency consistent with the

Acceptance Criteria: Acceptance criteria for hazard barrier doors and gaskets associated with water-tight hazard barrier doors are provided in PBAPS procedures. If an indication or evidence of a degraded condition is found, the information is forwarded to engineering for evaluation to determine if an unacceptable visual indication of loss of material, cracking, or change in material properties exists. The staff considers these generic acceptance criteria adequate for detecting the aging effects.

Operating Experience: A review of the operating experience for hazard barrier doors and gaskets associated with water-tight hazard barrier doors found no degraded conditions due to loss of material, change in material properties, or cracking that resulted in loss of intended function. Corrosion on hazard barrier doors was found in a few instances, mainly on those doors with one face exposed to an outdoor environment. This condition was typically due to drainage problems that allowed the water to run toward the door rather than away from it. Corrective actions were taken to eliminate the drainage problem and door degradation prior to loss of intended function. There were a few instances of water-tight door gasket replacements. The cause, in most cases, was manmade. Plant documentation cited a few instances of debris within the gasket folds preventing door closure. Debris was removed and gaskets inspected with no detrimental effects observed. The staff finds that the operating experience indicates that the applicant's door inspection and maintenance activities will provide reasonable assurance that the intended function of the doors will be maintained.

3.0.3.14.3 UFSAR Supplement

The staff reviewed Section A.2.6 of the UFSAR Supplement (Appendix A of the LRA) to verify that the information provided in the UFSAR Supplement for the aging management of systems and components discussed above is equivalent to the information in NUREG-1800 and therefore provides an adequate summary of program activities as required by 10 CFR 54.21(d).

The summary description of the door inspection program provided in Section A.2.6 of Appendix A to the LRA does not reflect the additional commitment made by the applicant to include monitoring of hazard barrier doors in a sheltered environment for loss of material due to corrosion. **This is Confirmatory Item 3.0.3.14.3-1.**

From: "Phillabaum, Jerry L." <jerry.phillabaum@exeloncorp.com>
To: "David Solorio (E-mail)" <dls2@nrc.gov>
Date: 10/4/02 3:37PM
Subject: FW: Resolution to Open Item 2.3.3.8.2-1

Please share this proposed response to ensure that it will close out this open item. We will be pleased to discuss this, if required.

> -----Original Message-----
> From: Muggleston, Kevin P.
> Sent: Thursday, October 03, 2002 9:33 AM
> To: Patel, Erach D.; Phillabaum, Jerry L.
> Subject: Resolution to Open Item 2.3.3.8.2-1
>
> Proposed resolution is attached.
>
> <<Open Item 2.3.3.8.2-1.doc>>

Open Item 2.3.3.8.2-1 Response:

The control room emergency ventilation system charcoal and HEPA filters shown on drawing LR-M-384 sheet 1 are installed and fully enclosed inside a common filter plenum. The filter plenum is included in the scope of license renewal, and is identified in LRA Table 2.3.3-8 as a sheet metal plenum.

(10/10) Got to Jana

Exelon

FAX

To: DAVE SOLORIO	From: JERRY PHILLABAUM
Fax: (301) 415-2279	Street: 200 Exelon Way, KSA [redacted] 1-N-3
Phone: (301) 415-1973	City: Kennett Square
Re: OI 2.3.2.7.2-2	State: PA
Pages:	Zip: 19348
CC:	Phone:
Date: 10/7/02	Fax: 610-765-[redacted]5640

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Please pass these to your reviewers to ensure that our response is sufficient. We will be pleased to support a call, if required.

Open Item 2.3.2.7.2-2 Resolution:

License renewal drawings LR-M-391 sheets 1 and 2 show portions of the standby gas treatment system and portions of the secondary containment system that are in the scope of license renewal. System boundary flags delineate these two systems. The secondary containment system includes air-operated butterfly valves and does not include any dampers (P&ID symbols for butterfly valves and dampers are shown on LR-M-300 sheet 2). Therefore, LRA Table 2.3.2-8, Component Groups Requiring Aging Management Review – Secondary Containment System, includes valve bodies but does not include damper enclosures. The standby gas treatment system includes both air-operated butterfly valves and dampers. Therefore, LRA Table 2.3.2-7, Component Groups Requiring Aging Management Review – Standby Gas Treatment System, includes both valve bodies and damper enclosures.

10/10 Conf call w/ Jelly Eric

Tank said this response closes both parts of this OI

- 2.3.2.7 has dampers
- 2nd cont has no dampers

10/10 Gave to Janet

Exelon

FAX

To: DAVE SOLORIO From: JERRY PHILLABAUM

Fax: (301) 415-2279 Street: 200 Exelon Way, KSA [redacted] 1-N-7

Phone: (301) 415-1973 City: Kennett Square

Re: OI 2.3.3.9.2-1 State: PA

Pages: Zip: 19348

CC: Phone:

Date: 10/7/02 Fax: 610-765-~~5654~~ 5640

☐ Urgent ☒ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

Please share this with the reviewer to ensure that our response is acceptable. We will be pleased to support a call, if required.

Open Item 2.3.3.9.2-1 Resolution:

These heating coils (0AE073, 0BE073) have been included in the scope of license renewal. They are listed in the Auxiliary Steam System as heat exchangers (ventilation heaters) components, which have been added to the scope of license renewal as indicated in the response to NSR/SR spatial interaction RAIs 2.1.2-3, 2.1.2-4, and 3.3-1 transmitted by Exelon letter dated May 21, 2002 (page 25 of 28).

Should be subject to AMR
+ aging management

10/10 Gave to Janek

Exelon

FAX

To: DAVE SOLORIO From: JERRY PHILLABAUM

Fax: (301) 415-2279 Street: 200 Exelon Way, KSA [redacted] 1-N-7

Phone: (301) 415-1973 City: Kennett Square

Re: OI 2.3.2.7.2-1 State: PA

Pages: Zip: 19348

CC: Phone:

Date: 10/7/02 Fax: 610-765-~~5664~~ 5640

☐ Urgent ☒ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

Please share this with the reviewer to determine if our response is acceptable. We will be pleased to support a call, if required.

10/10 Conf call - looks ok but we will get back to them if we have more questions.

2.3.2.7.2-1 The staff considers the applicants response is partially acceptable since prefilters, HEPA filters, and charcoal filters are governed by technical specification (TS) requirements or plant procedures which provide for their replacement in accordance with TS surveillance requirements or plant procedures. The staff does not agree that the demisters, fire spray nozzles, and heating coils should be excluded from AMR because if any one of these components should fail, the intended function of the filtration unit may not be accomplished. **This is Open Item 2.3.2.7.2-1.**

Open Item 2.3.2.7.2-1 Resolution:

LRA Table 2.3.2-7 is revised to include the demisters, as shown below.

Table 2.3.2-7 Component Groups Requiring Aging Management Review - Standby Gas Treatment System

Component Group	Component Intended Function	Environment
Casting and Forging • Valve Bodies	• Pressure Boundary	Ventilation Atmosphere, Sheltered
Elastomer • Fan Flex Connections • Filter Plenum Access Door Seals	• Pressure Boundary	Ventilation Atmosphere, Sheltered
Piping • Pipe	• Pressure Boundary	Buried
Piping • Pipe • Tubing • Fittings	• Pressure Boundary	Sheltered
Piping • Pipe • Tubing • Fittings	• Pressure Boundary	Ventilation Atmosphere
Piping Specialties • Flow Elements • Pressure Elements • Temperature Element Couplings	• Pressure Boundary	Ventilation Atmosphere, Sheltered
Sheet Metal • Ducting • Plenums • Fan Enclosures • Damper Enclosures	• Pressure Boundary	Ventilation Atmosphere, Sheltered
Sheet Metal • Louvers	• Throttle	Ventilation Atmosphere
Sheet Metal • ***Demisters***	• ***Filter***	***Ventilation Atmosphere***

LRA Table 3.2-7 is revised to include the demisters, as shown below.

Table 3.2-7 Aging Management Review Results for Component Groups in the Standby Gas Treatment System

Component Group	Component Intended Function	Environment	Materials of Construction	Aging Effect	Aging Management Activity
Casting and Forging • Valve Bodies	• Pressure Boundary	Sheltered, Ventilation Atmosphere	Carbon Steel, Stainless Steel, Bronze, Brass	None	• Not Applicable
Elastomer • Fan Flex Connections	• Pressure Boundary	Ventilation Atmosphere, Sheltered	Fiberglass Impregnated Neoprene	Change in Material Properties	• Ventilation System Inspection and Testing (B.2.3)
Elastomer • Filter Plenum Access Door Seals	• Pressure Boundary	Ventilation Atmosphere, Sheltered	Sponge Neoprene Rubber	Change in Material Properties	• Ventilation System Inspection and Testing (B.2.3)
Piping • Pipe	• Pressure Boundary	Buried	Carbon Steel	Loss of Material	• Outdoor, Buried and Submerged Component Inspection (B.2.5)
Piping • Pipe • Tubing • Fittings	• Pressure Boundary	Sheltered	Carbon Steel, Stainless Steel, Copper, Dielectric Unions	None	• Not Applicable
Piping • Pipe	• Pressure Boundary	Ventilation Atmosphere	Carbon Steel	None	• Not Applicable
Piping • Fittings	• Pressure Boundary	Ventilation Atmosphere	Carbon Steel, Dielectric Unions	None	• Not Applicable
Piping • Tubing	• Pressure Boundary	Ventilation Atmosphere	Copper, Stainless Steel	None	• Not Applicable

Component Group	Component Intended Function	Environment	Materials of Construction	Aging Effect	Aging Management Activity
Piping Specialties • Flow Elements • Pressure Elements • Temperature Element Couplings	• Pressure Boundary	Sheltered, Ventilation Atmosphere	Carbon Steel, Stainless Steel, Anodized Aluminum	None	• Not Applicable
Sheet Metal • Ducting • Plenums • Fan Enclosures • Damper Enclosures	• Pressure Boundary	Sheltered	Carbon Steel, Galvanized Steel	None	• Not Applicable
Sheet Metal • Plenums	• Pressure Boundary	Ventilation Atmosphere	Carbon Steel	None	• Not Applicable
Sheet Metal • Fan Enclosures	• Pressure Boundary	Ventilation Atmosphere	Carbon Steel	None	• Not Applicable
Sheet Metal • ***Demisters***	• ***Filter***	***Ventilation Atmosphere***	***Carbon Steel***	***None***	• ***Not Applicable***
Sheet Metal • Louvers	• Throttle	Ventilation Atmosphere	Galvanized Steel	None	• Not Applicable
Sheet Metal • Ducting • Damper Enclosures	• Pressure Boundary	Ventilation Atmosphere	Galvanized Steel	None	• Not Applicable

The fire spray nozzles are included in the scope of license renewal under the Fire Protection system. These nozzles are included in LRA Table 2.3.3-7 as Piping Specialties – Discharge Nozzles.

The heating coils are electric heating coils. These heating coils do not have a pressure boundary housing. They are installed and enclosed within the standby gas treatment system filter plenum. The plenum is included in LRA Table 2.3.2-7. These electric heating coils are active components and are therefore not subject to an aging management review.

Exelon

FAX

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Phone: (301) 415-1973 City: Kennett Square

Re: SER OI 2.3.3.8.2-2 State: PA

Pages: ~~4~~ 5 Zip: 19348

CC: Phone:

Date: Fax: 610-765-~~5654~~ 5640

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Please share page 2-73 that is marked to eliminate an error (LRA Section 2.3.3.8 does not state the control room air conditioning ventilation subsystem is required during normal, abnormal, and accident conditions.) and our proposed information to close the open item.

If there are questions, please arrange a conference call.

- closed cooling control room ventilation, fan, OOV326 at location C4
- filter, OOF327 at location C3
- control room ventilation reheat coil, OOE072 at location H2
- balance dampers at locations F7 and G7
- control room toilet exhaust fan, OOV033 at location G8
- ductwork, dampers, and instrumentation tubing and valves

If the components and the associated housings identified above were excluded from the scope of license renewal and not subject to an AMR, the applicant was asked to provide justification for their exclusion.

The applicant responded that, as indicated on license renewal drawing legend LR-M-300, license renewal drawing note 1, with the exception of the reheat coil 00E072, none of the above-identified components are highlighted on the license renewal drawing and none fall within the scope of license renewal. The components identified in this RAI are not required to support the system intended functions of control room isolation, filtration, and ventilation and are therefore not within the scope of license renewal. The reheat coil 00E072 is addressed in the response to RAI 2.3.3.8-2, above.

The staff considers the applicant's response to RAI 2.3.3.8-5 incomplete because the system's safety-related radiation, cooling, and toxic protection functions are required to meet Appendix A to 10 CFR Part 50, GDC 19. LRA Section 2.3.3.8 states that the control room air conditioning ventilation subsystem (of CRVS) provides ventilation for the control room during normal, abnormal, accident, and accident conditions. Also, the UFSAR subsection 10.13.4 states that the emergency cooling and ventilation system for the control room and other safety-related equipment rooms are installed in seismic Class I structure and are provided with 100% redundancy. Therefore, the staff finds that the control room air conditioning ventilation subsystem provides a safety-related cooling function to meet the requirements of GDC 19. Therefore, the applicant needs to include the CRVS subsystem components listed below within the scope of license renewal and subject to an AMR (in LRA Tables 2.3.3-8 and 3.3-8) in accordance with 10 CFR 54.4 and 10 CFR 54.21 (a)(1) or justify their exclusion:

LRA Drawing LR-M-384, Sheet 2

- Housings for supply fans (OAV028/OBVO28),
- Cooling coils (OAE069/OBE069)
- Ductwork and damper housings

LRA Drawing LR-M-384, Sheet 3

- Housings for two balance dampers at F7 and G7
- Housings for return air fans (OAV029/OBV020)
- Ductwork and damper housings

Additionally, if the fiter media and filter housings for the supply roll filter and bag filter (OOF038/OOF057, as shown in LRA Drawing LR-M-384, Sheet 2) were excluded on the basis that these media components are routinely replaced (i.e., they are consumables) the applicant should describe the plant specific monitoring program and the specific performance standards and critieria for periodic replacement. **This is Open Item 2.3.3.8.2-2.**

Open Item 2.3.3.8.2-2 Response:

The Control Room Ventilation System (briefly described in LRA Section 2.3.3.8) consists of the Control Room Fresh Air Supply (CRFAS) System, the Control Room Emergency Ventilation (CREV) Filter System, the Control Room Air Conditioning Ventilation (A/C Vent) Supply System, the Control Room Return Air System, and the Control Room Toilet Exhaust System. Of these, only the Control Room Fresh Air Supply System and the Control Room Emergency Ventilation Filter System are safety-related and relied upon to assure control room habitability. Detailed system descriptions are provided below.

The CRFAS System is a safety-related system that provides air to the main control room (MCR). The CRFAS System consists of two 100% capacity, redundant Control Room Fresh Air Supply Fans 0AV079 and 0BV079, Roll Filter 00F039, and Preheat Coil 00E068. The CRFAS System is supplied with outside air from the Outside Air Intake Plenum. The outside air ductwork connects with the Control Room Fresh Air Supply Roll Filter, the Control Room Area Preheat Coil, and then to the inlet ducts of the redundant Control Room Fresh Air Supply Fans which are provided with intake dampers. There are two (2) flow detectors mounted in the duct upstream of the Control Room Fresh Air Supply Fans. The outlet ducts from these fans are provided with discharge dampers and connect to a common discharge duct. The common discharge duct is connected to additional ductwork provided with balance dampers that allow the outside air to be distributed directly to the control room area rooms (during emergency operation) or to the inlet of the Control Room A/C Vent Supply System where it combines with return air from the Control Room Return Air System (during normal operation). The CRFAS System and associated components, ductwork and housings, are included in the scope of license renewal as shown on drawing LR-M-384 sheet 1.

The CREV Filter System is a safety-related system which consists of two 100% capacity filter units and redundant CREV Supply Fans 0AV030 and 0BV030. Each filter unit consists of a charcoal filter 0AF042 (0BF042) and two banks of HEPA filters 0AF041 (0BF041) and 0AF050 (0BF050), upstream and downstream of the charcoal filter. The CREV Filter System is supplied with outside air by two redundant ducts connected to the common outside air duct between the Control Room Area Pre-heater Coil and the intake ducts to the Control Room Fresh Air Supply Fans. The redundant ducts connect to the intake ducts of the redundant filter units. The outlet ducts of the filter units then connect to the inlet ducts of the redundant CREV Supply Fans. The outlet ducts from these fans connect to a common discharge duct and is used to distribute air to the control room area rooms. The CREV Filter System and associated components, ductwork and housings, are included in the scope of license renewal as shown on drawing LR-M-384 sheet 1.

The Control Room A/C Vent Supply System is a non-safety-related system which consists of the Control Room A/C Supply Roll Filter 0OF038, Control Room A/C Ventilation Supply Bag Filter 0OF057, two 100% capacity, redundant Control Room A/C Supply Cooling Coils 0AE069 and 0BE069, two 100% capacity redundant humidifiers, two 100% capacity, redundant Control Room A/C Vent Supply Fans 0AV028 and 0BV028, Control Room Zone Reheat Coil 00E072, the Control Room North Office A/C Fan Suction Filter 00F327, Control Room North Office Cooling Coil 00E396, and Control Room North Office Cooling Unit Fan 00V326. The Control Room A/C Vent Supply System is supplied with outside air from the CRFAS System. A common duct connects with the Control Room Return Air System and then connects to the Control Room A/C Supply Roll Filter, the Control Room A/C Ventilation Supply Bag Filter, and the inlet ducts to the redundant Control Room A/C Supply Cooling Coils that are provided with dampers. A by-pass duct with a damper is provided around each cooling coil. Humidifiers are provided in each cooling coil discharge duct that connects to the Control Room A/C Vent Supply Fans. The discharge ducts from the supply fans are provided with dampers and then connect to the common duct serving the control room area rooms. The Control Room Zone Reheat Coil is installed in the common duct. Provision has been made for purging of the Main Control Room by providing a separate Purge Air Outside Air Intake Plenum and the Control Room Purge Air Preheat Coil

00E110. With the exception of the Control Room Zone Reheat Coil 00E072, the Control Room A/C Vent Supply System is not safety-related and is not required to maintain control room habitability. The CRFAS System and the Control Room Emergency Ventilation Filter System (each described above) are adequate to assure control room habitability. The Control Room A/C Vent Supply System is not included in the scope of license renewal, as shown on license renewal drawings LR-M-384 sheets 2 and 3. The Control Room Zone Reheat Coil 00E072 is located in ductwork common with the Control Room Emergency Ventilation Filter System, and is therefore included in the scope of license renewal as shown on license renewal drawing LR-M-384 sheet 3.

The Control Room Return Air System is a non-safety-related system which consists of two 100% capacity, redundant Control Room Ventilation Return Fans 0AV029 and 0BV029. Redundant return air ducts, provided with dampers, are connected to the Main Control Room and the Control Room Peripheral Area. The return air ducts are connected to a common return duct, which is then connected to the inlet ducts of the Control Room Ventilation Return Fans. The inlet ducts are provided with intake dampers. The discharge ducts from the return fans are provided with dampers and connect to a common duct, which allows the return air to either be returned to the Control Room A/C Vent Supply System or to be exhausted through an exhaust structure located on the Control Room roof. The Control Room Return Air System is not safety-related and is not required to maintain control room habitability. The CRFAS System and the CREV Filter System (each described above) are adequate to assure control room habitability. The Control Room Return Air System is not included in the scope of license renewal, as shown on license renewal drawings LR-M-384 sheet 3.

The Control Room Toilet Exhaust System is a non-safety-related system which consists of the Control Room Toilet Exhaust Fan 00V033. Exhaust ducts from the Main Control Room Ceiling Area, Lunch Room, and Toilet Room are connected to the inlet of the Control Room Toilet Exhaust Fan. The outlet duct is connected to an exhaust structure located on the Control Room roof, which provides for the discharge of the exhaust air to the atmosphere. The Control Room Toilet Exhaust System is not safety-related and is not required to maintain control room habitability. The CRFAS System and the CREV Filter System (each described above) are adequate to assure control room habitability. The Control Room Toilet Exhaust System is not included in the scope of license renewal, as shown on license renewal drawings LR-M-384 sheet 3.

As indicated in LRA Section 2.3.3.8, the intended functions of the Control Room Ventilation System are Control Room Isolation and Filtration and Ventilation. Normal control room cooling, such as that provided by the Control Room Air Conditioning Ventilation Supply System using cooling coils supplied by the Chilled Water System, is not a safety-related intended function. The Ventilation function, accomplished by operation of the Control Room Fresh Air Supply System or the Control Room Emergency Ventilation Filter System, provides adequate cooling for control room habitability by providing a constant supply of outside air to the control room. If needed, the Control Room Emergency Ventilation Filter System can filter the outside air.

This Open Item lists supply fans 0AV028/ 0BV028, cooling coils 0AE069/0BE069, and associated ductwork and damper housings shown on license renewal drawing LR-M-384 sheet 2, as components to be included in the scope of license renewal, or their exclusion needs to be justified. As discussed in the above system description, these components are part of the Control Room A/C Vent Supply System. The Control Room A/C Vent Supply System provides normal control room cooling, but is not required for control room habitability and does not have any safety-related system intended functions. Therefore, these associated components are not within the scope of license renewal and are not subject to an AMR.

This Open Item lists return air fans 0AV029/ 0BV029, balance dampers at drawing zone F7 and G7, and associated ductwork and damper housings shown on license renewal drawing LR-M-384 sheet 3, as components to be included in the scope of license renewal, or their exclusion needs to be justified. As discussed in the above system description, these components are part of the

Control Room Return Air System or the Control Room Toilet Exhaust System. These systems are not required for control room habitability and do not have any safety-related system intended functions. Therefore, these associated components are not within the scope of license renewal and are not subject to an AMR.

This Open Item requests the basis for the exclusion of supply roll filter 00F038 and bag filter 00F057. As discussed in the above system description, these components are part of the Control Room A/C Vent Supply System. The Control Room A/C Vent Supply System provides normal control room cooling, but is not required for control room habitability and does not have any safety-related system intended functions. Therefore, these associated components are not within the scope of license renewal and are not subject to an AMR.

Exelon

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Please share this with Cliff Munson to ensure that we correctly understood that this would close out the open item discussed on 9/26/02.

Cliff, The new words are in bold marked by " → "

B.1.16 Maintenance Rule Structural Monitoring Program

ACTIVITY DESCRIPTION

The maintenance rule structural monitoring program is that portion of the PBAPS maintenance rule structural monitoring program that is being credited for license renewal.

The maintenance rule structural monitoring program provides for condition monitoring of structures and components within the scope of license renewal that are not covered by other existing inspection programs. The program complies with the 10CFR50.65 and is implemented through a PBAPS procedure.

EVALUATION AND TECHNICAL BASIS

(1) Scope of Activity: The maintenance rule structural monitoring program provides for condition monitoring of:

- ***Reinforced concrete components, masonry block walls, and grout in accessible areas.***
- Structural steel and component supports outside primary containment; excluding ASME Class 1, 2, or 3 piping and equipment;
- Structural steel and component supports inside the primary containment; excluding primary containment pressure boundary components, Class MC component supports, and ASME Class 1, 2, or 3 piping and equipment.
- Penetration seals and expansion joint seals.

(2) Preventive Actions: The maintenance rule structural monitoring program is a condition monitoring program that utilizes inspections to identify aging effects prior to loss of intended function. No preventive or mitigating attributes are associated with this program.

(3) Parameters Monitored/Inspected: The maintenance rule structural monitoring program specifies visual inspection of:

- ***Reinforced concrete components and masonry block walls, in accessible areas, for loss of material, cracking, and evidence of a change in material properties due to leaching of calcium hydroxide;***
- ***Grout, in accessible areas, for cracking.***
- Carbon steel structural components and component supports for loss of material due to corrosion; qualitative

- Penetration seals and expansion joint seals for gaps, voids, tears and general degradation associated with cracking, delamination and separation, and change in material properties.

(4) Detection of Aging Effects: The method, extent and frequency of maintenance rule structural monitoring program inspections provide reasonable assurance of detection of ***reinforced concrete components, masonry block walls, grout, carbon steel components***, and penetration seals aging effects prior to a loss of intended function.

(5) Monitoring and Trending: Structures and components are inspected at least once every four years, with provisions to perform trending and root cause analysis and increase the frequency of inspections in the event problems are identified.

(6) Acceptance Criteria: Maintenance rule structural monitoring program inspection results are documented and evaluated by qualified personnel. Evaluations are based on ensuring that the intended functions of the structure or component are maintained. The acceptance criteria are consistent with the recommended criteria in NUMARC 93-01, Revision 2.

- Acceptance criteria for ***reinforced concrete components, masonry block walls, and grout are based on an evaluation of their*** condition when compared to the condition from previous inspections in order to verify that no changes have occurred that may affect their ability to perform their intended functions.

- Acceptance criteria for structural steel are directed at finding corrosion that may affect its ability to perform its intended functions.

- Acceptance criteria for visual inspection of the emergency cooling water outdoor piping support anchors require that structures be free of corrosion that could lead to possible failure.

- Acceptance criteria for the inspections performed on penetration seals and expansion joint seals are provided on PBAPS drawings and in the inspection procedure for these seals. These documents are directed at finding any changes in the condition of these components that may affect their ability to perform their intended functions.

(7) Corrective Actions: Identified deviations are evaluated within the PBAPS corrective action process which includes provisions for root cause determinations and corrective actions to prevent recurrence as dictated by the significance of

the deviation.

(8) Confirmation Process: The PBAPS corrective action process includes:

- Reviews to assure that proposed actions are adequate;
- Tracking and reporting of open corrective actions; and
- For root cause determinations, reviews of corrective action effectiveness.

(9) Administrative Controls: All credited aging management activities are subject to administrative controls, which require formal reviews and approvals.

(10) Operating Experience: Aging effects have been detected and evaluated by the program before loss of intended function, providing reasonable assurance that the intended function of structures and components will be maintained during the period of extended plant operation. Specific PBAPS experiences include:

- Effective management of change in material properties due to contact of the emergency cooling tower and reservoir reinforced concrete walls with raw water by the detection and monitoring of leaching of calcium hydroxide. These walls have not experienced a loss of intended function.

- No loss of function of the emergency cooling water outdoor piping support anchors resulting from aging of the anchors. A review of industry experience shows that salt water corrosion and boric acid corrosion are the most common causes of loss of material for anchors. The anchors at PBAPS are not subjected to an environment containing either salt water or boric acid.

- Degraded conditions were found for some penetration and expansion joint seals. Most of the degradation was not attributed to aging effects. Corrective actions for all degraded conditions were taken prior to loss of any intended function.

SUMMARY

The maintenance rule structural monitoring program provides for condition monitoring of structures and components within the scope of license renewal that are not covered by other existing inspection programs. The program complies with the 10CFR50.65 and uses acceptance criteria that are consistent with the recommended criteria in NUMARC 93-01, Revision 2.

Based on the PBAPS operating experience and the use of acceptance criteria consistent with industry recommendations, there is reasonable assurance that the maintenance rule structural monitoring program will continue to adequately manage the identified aging effects on the structures and components so that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

REFERENCES

(1) NUMARC 93-01, Revision 2 "Monitoring the Effect of Maintenance at Nuclear Power Plants"

Exelon

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Please set up a conference call so that we ensure that we provide information sufficient to close this item.

"Want to have Discussion on this"

Peach Bottom Atomic Power Station

SER Open Item 3.0.3.16.2-1: Provide information for the DDFP oil flex hoses comparable to that for the EDG flex hoses

Information in the PBAPS LRA:

Comparison of AMP attributes for oil environment flexible hoses

there now — will be there

Attribute	Emergergency Diesel Generator AMP B.2.4	Fire Protection AMP B.2.9
3 - Parameters Monitored	Visual inspection for change in material properties	Visual inspection for change in material properties
4 - Detection of aging effects	Visual inspection for change in material properties by observation of swelling or cracking	Visual inspection for change in material properties
5 - Monitoring & Trending	Visual inspection for change in material properties will be conducted every two years	Visual inspection for change in material properties will be inspected on a periodic basis
6 - Acceptance Criteria	Examinations for change in material properties are conducted in accordance with approved PBAPS procedures	Inspections for change in material properties are conducted in accordance with approved PBAPS procedures

Additional information to address the SER Open Item:

The PM activity has been enhanced to include a visual inspection of the flexible hose for aging effects of change in material properties such as cracking and hardening. Guidance is given to replace the hose as required. This PM activity is scheduled every 5 years.