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

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

Subject: Response to Request for Additional Information Related to Appendix B Aging Management Activities

Reference: Letter from R. K. Anand (USNRC) to M. P. Gallagher (Exelon), dated March 6, 2002

Dear Sir/Madam:

Exelon Generation Company, LLC (Exelon) hereby submits the enclosed responses to the request for additional information transmitted in the reference letter. For your convenience, Attachment 1 restates the questions from the reference letter and provides our responses.

If you have any questions or require additional information, please do not hesitate to call.

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

Respectfully,

Executed on 5-20-02

Michael P. Gallagher
Director, Licensing & Regulatory Affairs
Mid-Atlantic Regional Operating Group

Enclosures: Attachment 1

cc: H. J. Miller, Administrator, Region I, USNRC
A. C. McMurtray, USNRC Senior Resident Inspector, PBAPS

A087

ATTACHMENT 1

Exelon Generation Company, LLC (Exelon)
License Renewal Application (LRA)
Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3

Request for Additional Information
EMCB AMP RAIs for Peach Bottom LRA

B1.1 "Flow Accelerated Corrosion Program"

B1.1-1

Monitoring of water chemistry to control pH and dissolved oxygen content is effective in reducing flow accelerated corrosion (FAC). The staff is not certain that this activity is included in the applicant's FAC AMP. If so, would this affect the description of the preventive or mitigative actions program attributes?

Response:

As stated in attribute 5, Monitoring and Trending, the FAC program provides for analytical evaluations using parameters such as pH and oxygen content to predict wall thickness reduction due to FAC.

B1.1-2

The staff is not clear as to the applicant's approach in identifying the susceptible components and locations to manage FAC. Provide information regarding how the susceptible components and locations are identified to manage FAC.

Response:

The susceptible piping systems are divided into two categories: Category 1, which consists of piping systems, or portions of systems, that are susceptible to FAC and have a completed FAC Wear Rate analysis in Electric Power Research Institute (EPRI) CHECWORKS computer code, and Category 2, which consists of piping systems, or portions of systems, that are susceptible to FAC but do not have a completed FAC Wear Rate analysis in CHECWORKS.

For Category 1 systems, susceptible locations and components are based on CHECWORKS Wear Rate ranking results for each piping system. To the extent practical, varying geometry types (i.e., elbows, reducers, tees, etc.) are selected.

For category 2 systems, locations are conservatively selected using a combination of engineering judgment, industry experience, and plant experience. Special consideration is given to such locations as nozzles and tees that are downstream of orifices or have complex geometry.

Components are selected in systems documented in industry and regulatory reports, such as NRC Information Notices, Significant Operating Experience Reports (SOERs), and EPRI reports; to be susceptible to FAC. Plant operating experience is determined through previous UT results.

B1.1-3

The staff believes that there should be a predictive code in place in order to analytically evaluate FAC. Will CHECKWORKS, or some other predictive code, be used for the analytical evaluations? If so, provide the basis for the acceptability of the code used.

Response:

CHECWORKS computer code is used at PBAPS for analytical evaluations. EPRI Nuclear Safety Analysis Center (NSAC)-202L guidelines provide for an effective FAC program. The NSAC guidelines include the use of a predictive code, such as CHECWORKS, that uses the implementation guidance of NSAC-202L. NUREG-1801, Generic Aging Lessons Learned (GALL) Report, Chapter XI.M17, "Flow Accelerated Corrosion Program," also considers CHECWORKS as an acceptable predictive code.

B1.1-4

The extent of the degradation of the main feedwater piping at the time of discovery of the incident reported in NRC IN 2001-09, "Main Feedwater System Degradation in Safety-Related ASME Code Class 2 Piping Inside the Containment of a Pressurized Water Reactor," is of particular concern given the maturity of the industry's FAC program. Even though this reported incident is related to a PWR plant, numerous incidents of wall thinning due to erosion/corrosion have been reported for both PWR and BWR plants. The staff is not certain whether the applicant has considered the operating experience reported in NRC Information Notice 2001-09. Please address this issue.

Response:

Regulatory reports such as NRC Information Notices are routinely reviewed at PBAPS for applicability. Although NRC IN 2001-09 only applies to PWRs and therefore is not applicable to PBAPS, it will be reviewed at PBAPS to determine if any changes to the existing FAC program are required.

B1.3 "Closed Cooling Water Chemistry"

B1.3-1

The applicant has identified the chemistry control parameters to be monitored that include, per the recommendations of EPRI TR-107396, nitrite, pH and methylbenzyl triazole (TTA) levels. Chlorides, sulfates, nitrate, turbidity and metals are monitored on a regular basis as diagnostic parameters to provide indication of abnormal conditions. The applicant does not link these parameters to the degradation of the particular structures' and components' intended functions as specified in Section A.1.2.3.3. of NUREG-1800. The applicant needs to provide linkage of the parameters monitored to the degradation of the specific components intended function(s).

Response:

The components affected by the closed cooling water chemistry AMP are in the emergency diesel generator and primary containment isolation systems. The aging effects managed are loss of material, cracking, and reduction of heat transfer. The component intended functions are linked to the components, aging effects, and the AMP in LRA Tables 3.2-3 and 3.3-16. The component intended functions are pressure boundary and heat transfer. The parameters monitored in the closed cooling water chemistry AMP provide reasonable assurance that the aging effects are managed so that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

B1.3-2

Section 5, "Performance Monitoring," of EPRI TR-107396 recommends that the sampling frequency on the CCW chemistry should be increased if aging effects are detected or suspected. Address this and if so, the applicant should confirm that the increased frequencies are included in the station procedures.

Response:

When the parameters that are monitored exceed the expected values, Chemistry supervision is notified, the situation is evaluated and appropriate corrective actions are implemented. These actions are determined by Chemistry supervision on a case-by-case basis and may include re-analysis, chemical additions, system adjustments, or increased sampling frequency. Increased sampling frequency is not always indicated, nor does it correct the abnormal condition.

B1.3-3

Chlorides, sulfates, nitrate, turbidity and metals are monitored on a regular basis as diagnostic parameters to provide indication of abnormal conditions. As indicated in Section A1.2.3.6 of NUREG-1800 (July 2001), the applicant should state the acceptance criteria for these species.

Response:

The PBAPS closed cooling water chemistry activities are based on EPRI TR-107396, "Closed Cooling Water Chemistry Guidelines." 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, sulfates, nitrates, turbidity and metals are trended. If the sample analysis indicates a change, Chemistry supervision is notified, the situation is evaluated and appropriate corrective actions are implemented.

B1.3-4

Section A1.2.3.10 of NUREG-1800 indicates that the information provided by the operating experience of an AMP may indicate when an existing program has succeeded and when it has failed in intercepting aging degradation in a timely manner. An existing AMP is effective if the operating experience of the AMP (including corrective actions, if necessary) demonstrates that aging degradation has been found in a timely manner prior to the actual loss of the component intended function. To this end, please describe any operating experience related to component age degradation due to cracking and loss of material, or reduction of heat transfer due to corrosion, occurring prior to age-related failures of the intended functions of the component. In addition, address the corrective actions performed prior to age-related failures.

Response:

The aging management review of operating experience did not identify any age related degradation that required corrective action in the closed cooling water environment.

B1.4 "Condensate Storage Tank Chemistry Activities"

B1.4-1

The staff believes that there should be a one-time inspection program to verify the effectiveness of the CST water chemistry control to manage loss of material of carbon steel components exposed to the CST water. If there is, include it; if not, explain the basis of not including a one-time inspection for this AMP.

Response:

We have operating experience that verifies the effectiveness of the CST chemistry activities. Piping inspections are routinely performed in the ISI and FAC programs and have been satisfactory. Much of this piping is ASME Section XI class 2 piping which requires periodic inspections of welds and pressure tests to verify integrity. In addition, the FAC program performs inspections at several susceptible locations to verify required wall thickness. We believe that the CST chemistry activities are sufficient to adequately manage aging. The routine inspections performed for piping in the condensate storage water environment verify the effectiveness of the program.

B1.4-2

Cracking of stainless steel components exposed to the CST water may occur in locations of low flow or stagnant conditions. The staff believes that the CST chemistry activities AMP alone is inadequate to manage cracking of stainless steel components exposed to the CST water. Address station activities related to BWRVIP-75 or NRC GL 88-01 which delineates the extent, method, and schedule of the inspection and test techniques to detect cracking and ensures that cracks will be detected and repaired before the loss of intended function of the components.

Response:

BWRVIP-75 and GL 88-01 do not apply to the components exposed to the condensate storage water environment. The scope of BWRVIP-75 and GL 88-01 is for piping containing reactor coolant above 200° F. The condensate storage water environment is less than 200° F and is not reactor coolant.

B1.4-3

Section A1.2.3.10 of NUREG-1800 indicates that the information provided by the operating experience of an AMP may indicate when an existing program has succeeded and when it has failed in intercepting aging degradation in a timely manner. An existing AMP is effective if the operating experience of the AMP (including corrective actions, if necessary) demonstrates that aging degradation has been found in a timely manner prior to the actual loss of the component intended function. To this end, please describe any crack initiation and growth due to stress corrosion cracking and loss of material due to corrosion experienced in the station prior to actual loss of intended function of the component. In addition, address the operating experience of aging degradation found and the corrective actions performed prior to age-related failures.

Response:

The aging management review of operating experience did not identify any age related degradation that required corrective action in the condensate storage water environment.

B1.5 "Torus Water Chemistry Activities"

B1.5-1

In the LRA, it is indicated that the loss of material of carbon steel structural supports submerged in torus water is managed by the ISI AMP. The staff believes that the ISI AMP or the one-time inspection AMP should be applied to the carbon steel components exposed to torus water in the HPCI, RCIC, RHR, core spray, and main steam systems. Please discuss.

Response:

The ISI AMP and the Torus Piping Inspection Activities apply to specific components in the torus grade water environment. For other carbon steel components in the torus grade water environment, the torus water chemistry activities will manage the aging effects. These components are identified in the LRA Section 3 tables for each system.

B1.5-2

The staff believes that there should be a one-time inspection that will be performed to verify the effectiveness of the torus water chemistry control. If there is, include it; if not, explain the basis for not including the one-time inspection.

Response:

We have operating experience that verifies the effectiveness of the torus water chemistry activities. Piping inspections are routinely performed on these systems in the ISI and FAC programs and have been satisfactory. Most of this piping is ASME Section XI class 2 piping which requires periodic inspections of welds and pressure tests to verify integrity. In addition, the FAC program inspects several locations on these systems at susceptible locations to verify required wall thickness. We believe that the torus water chemistry activities are sufficient to adequately manage aging. The routine inspections performed on the piping in the torus grade water environment verify the effectiveness of the program.

B1.5-3

For components exposed to torus water, address station activities related to BWRVIP-75 or NRC GL 88-01, which delineates the extent, method, and schedule of the inspection and test techniques to detect cracking and ensure that cracks will be detected and repaired before the loss of intended function of the component.

Response:

BWRVIP-75 and GL 88-01 do not apply to the components exposed to the torus grade water environment. The scope of BWRVIP-75 and GL 88-01 is for piping containing reactor coolant above 200°F. The torus grade water environment is less than 200°F and is not reactor coolant.

B1.5-4

As recommended in Table C-2 of Appendix C of the EPRI Report TR-103515, "BWR Water Chemistry Guidelines," the increased frequencies of sampling measurements of the torus water chemistry should be included in the station procedures if chemical ingress is detected or suspected. Confirm that this is done, and if not, provide a basis.

Response:

If chemical ingress is detected or suspected, the parameters monitored would be outside of their limits. In this condition Chemistry supervision is notified, the situation is evaluated and appropriate corrective actions are implemented. These actions are determined by Chemistry supervision on a case-by-case basis and may include re-analysis, system adjustments, or increased sampling frequency. Increased sampling frequency is not always indicated, nor does it correct the abnormal condition.

B1.5-5

The system description of the HPCI in the UFSAR indicates that HPCI has a primary water source from the condensate storage tank, which has demineralized water with a backup supply of torus water available from the suppression pool. The UFSAR also indicates that RCIC could have a water source from either the condensate water tank or the pressure suppression pool. Therefore, the components may be exposed to either torus water or demineralized water, or both. The specific limits of chemistry parameters and sampling frequency are quite different between the torus water chemistry and the CST water chemistry AMPs. Which of these two AMPs is credited for these systems and provide justification?

Response:

The HPCI and RCIC systems are normally lined up to have their water supply from the CST. In this configuration, most of the piping and components are in the CST water environment. The torus suction component groups and the piping that is inside the torus are always in the torus water environment. This is reflected in the system tables, Table 3.2.1 for HPCI and Table 3.2.4 for RCIC. The aging management review credited the torus water chemistry and CST water chemistry AMPs for the portion of the HPCI and RCIC system component groups that are in the respective environment. The only time that the torus water enters the piping that is normally exposed to the CST water is during a quarterly surveillance test which swaps the suction flowpath to the torus for a brief time. After this flowpath is proven, the piping is then flushed with CST water to reestablish the normal CST water environment. Also, there is an operating procedure that directs the piping to be flushed with CST water after any operation of the systems that used the torus as the water source.

B1.5-6

Section A1.2.3.10 of NUREG-1800 indicates that the information provided by the operating experience of an AMP may indicate when an existing program has succeeded and when it has failed in intercepting aging degradation in a timely manner. An existing AMP is effective if the operating experience of the AMP (including corrective actions, if necessary) demonstrates that aging degradation has been found in a timely manner prior to the actual loss of the component intended function. To this end, please describe any crack initiation and growth due to stress corrosion cracking and loss of material due to corrosion experienced in the station prior to actual loss of intended function of the component. In addition, address the operating experience of the aging degradation found and the corrective actions performed prior to age-related failures.

Response:

The aging management review of operating experience did not identify any age related degradation that required corrective action in the torus grade water environment.

B1.5-7

The amount of debris in strainers relates to the quality of the torus water. Address the operating experience of the strainers as well as debris in the torus water.

Response:

Operating experience of the strainers has been excellent. The differential pressure across the strainers is measured quarterly during the operability surveillance test. The data has been satisfactory since the strainers were installed. The inspection for debris in the Unit 3 torus in September 2001 found no measurable buildup of silt or sludge.

B1.6 "Fuel Pool Chemistry Activities"

B1.6-1

The staff believes that there should be a one-time inspection program to verify the effectiveness of the fuel pool water chemistry control to mitigate the loss of material of the carbon steel component exposed to fuel pool water. If so, include it; if not, what is your basis for not including this one-time inspection program?

Response:

We have operating experience that verifies the effectiveness of the fuel pool chemistry activities. The carbon steel components in the fuel pool cooling system LRA Table 3.3-2 are in the pipe from the RHR system to the fuel pool. This pipe was opened up and visually inspected in 2001 for Unit 3 and the results were satisfactory. The inspection of the similar pipe for Unit 2 is expected to be performed in 2004. Therefore, a one-time inspection program is not necessary.

B1.6-2

The fuel pool chemistry activities AMP alone cannot adequately manage cracking of stainless steel components exposed to fuel pool water. The fuel pool water could be contaminated due to free surface (the free surface of a liquid is the external surface of a liquid that is exposed directly to an air/gas environment). The staff believes that there should be a one-time inspection to verify the absence of cracking of stainless steel components exposed to fuel pool water (including consideration of free surface contamination). Please address. If not, what is the basis for not including this one-time inspection?

Response:

The operating experience described above in response to RAI B1.6-1 is also applicable here for verifying the effectiveness of the fuel pool chemistry activities.

EPRI TR-103840, "BWR Containment License Renewal Industry Report" and NUREG –0313, "Technical Report on Material Selection and Processing Guidelines For BWR Coolant Pressure Boundary Piping," consider operating temperature above 200° F as a limit of probable significant cracking of susceptible stainless steels.

The stainless steel components are exposed to fuel pool water. The fuel pool water normal operating temperature is 85° F with a high limit of 130° F. These temperatures are significantly lower than the 200° F referenced above. Consequently, cracking is not considered to be a significant aging effect for the fuel pool liner and components requiring aging management beyond the fuel pool chemistry activities.

B1.6-3

Section A1.2.3.10 of NUREG-1800 indicates that the information provided by the operating experience of an AMP may indicate when an existing program has succeeded and when it has failed in intercepting aging degradation in a timely manner. An existing AMP is effective if the operating experience of the AMP (including corrective actions, if necessary) demonstrates that aging degradation has been found in a timely manner prior to the actual loss of the component intended function. To this end, please describe any crack initiation and growth due to stress corrosion cracking and loss of material due to corrosion experienced in the station prior to actual loss of intended function of the component. In addition, address the operating experience of aging degradation found and the corrective actions performed prior to age-related failures.

Response:

The aging management review of operating experience did not identify any age related degradation that required corrective action in the fuel pool water environment.

B1.7 "High Pressure Service Water Radioactivity Monitoring Activities"

B1.7-1

It was indicated in the LRA that leakage and minor degradation have been found in the RHR heat exchangers on the HPSW system water (raw water) side. Is the degradation caused by the presence of the radioactive contaminants? If so, what is the implication of the operating experience for the effectiveness of the AMP? If not, what is the relevance of the operating experience to the AMP?

Response:

The leakage and minor degradation mentioned in Appendix B.1.7 attribute 10 was not caused by the presence of radioactive contaminants. The purpose of crediting this AMP for license renewal is to manage loss of material and cracking aging effects for the RHR heat exchangers. The HPSW radiation monitors provide a sensitive monitor to detect degradation of the heat exchangers. The HPSW radiation monitors detected leakage of the floating head gaskets promptly so that corrective actions could be taken prior to any loss of intended function.

B1.13 "Standby Liquid Control System Surveillance Activities"

B1.13-1

Since borated water can induce corrosion and cracking at tank bottom due to the presence of chlorides, sulfates, and contaminants, address why this AMP does not include preventive or mitigative actions such as controlling and monitoring the borated water chemistry to ensure that aging degradation is mitigated.

Response:

The borated water stored in the standby liquid control solution tank is prepared by mixing an enriched chemical material with demineralized water to form a sodium pentaborate solution. The sodium pentaborate solution provides a relatively mild environment whose pH is slightly basic.

The enriched chemical material is purchased as safety-related material under an approved purchase specification. The purchase specification requirements include impurity limits for chlorides, sulfates and other contaminants that are based on industry standards. Each batch of material is supplied with a certified chemical analysis that typically indicates impurity levels well below the established limits. The water source is demineralized water from the water treatment system, and is subject to water chemistry controls. Since impurities are controlled when preparing the tank solution, and there is no source for contaminants to subsequently enter the closed tank, the level of detrimental contaminants is adequately controlled and aging degradation is mitigated.

Based on discussions with the NRC staff during the RAI reviews, Exelon has decided to modify the aging management activities associated with the standby liquid control system. The modified aging management approach for the standby liquid control system includes water chemistry controls applied to the demineralized water system, and a one-time inspection of a representative section of standby liquid control system piping. LRA Appendix B.1.13, "Standby Liquid Control System Surveillance Activities," will be deleted. This modified approach for aging management of the standby liquid control system is the same approach that is described in NUREG-1803, "Safety Evaluation Report Related to the License Renewal of Edwin I. Hatch Nuclear Plant, Units 1 and 2."

NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," indicates that a water chemistry program in accordance with EPRI TR-103515 is an acceptable aging management program for the standby liquid control system (GALL Section VII E2). The GALL Report does not recommend a one-time inspection to verify the effectiveness of the water chemistry program to manage aging in the standby liquid control system.

The water chemistry activity described in LRA Appendix B.1.4 will be modified to include the demineralized water system supply to the standby liquid control system storage tank. This water chemistry program is based on EPRI TR-103515 as recommended in the GALL Report. In addition, although not a recommendation in the GALL Report, a one-time inspection of a representative section of standby liquid control system piping will be conducted to confirm the effectiveness of the water chemistry aging management activities.

A review of industry experience shows no failures of standby liquid control system piping and components due to age related degradation. As stated in NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," no occurrence of stress corrosion cracking in piping and other components in standby liquid control systems exposed to sodium pentaborate solution has ever been reported. Industry experience with standby liquid control system aging is assessed and documented in NUREG/CR-6001, "Aging Assessment of BWR Standby Liquid Control Systems." A review of the operating experience at PBAPS has not identified any failures due to loss of material or cracking of standby liquid control system piping and components.

The changes to the Appendix B.1.4 activity are shown below:

B.1.4 Demineralized Water and Condensate Storage Tank Chemistry Activities

ACTIVITY DESCRIPTION

Demineralized water and condensate storage tank (CST) chemistry activities consist of preventive measures that are used to manage aging in components of the RCIC, HPCI, CRD, core spray, **standby liquid control, demineralized water** and condensate storage systems exposed to condensate **and demineralized** water. **These** chemistry activities provide for monitoring and controlling of **the** CST **and demineralized** water chemistry using PBAPS procedures and processes based on EPRI TR-103515, "BWR Water Chemistry Guidelines".

EVALUATION AND TECHNICAL BASIS

(1) Scope of Activity: **Demineralized water and** CST chemistry activities manage loss of material and cracking in the RCIC, HPCI, CRD, core spray, **standby liquid control, demineralized water** and condensate storage system components exposed to **demineralized water or** condensate storage tank water. In addition, CST chemistry activities manage reduction of heat transfer in the HPCI gland seal condenser and the RCIC and HPCI turbine lubricating oil coolers. The aging effects are managed by monitoring and controlling detrimental contaminants in **the demineralized water system and the condensate storage tank.**

(2) Preventive Actions: **Demineralized water and** CST chemistry activities include periodic monitoring and controlling of the **demineralized water system and** CST water, to ensure known detrimental contaminants are maintained within pre-established limits, providing reasonable assurance that the aging effects of loss of material, cracking, and reduction of heat transfer are managed.

(3) Parameters Monitored/Inspected: Conductivity is maintained based on the EPRI guidance. Impurities identified in EPRI TR-103515, such as, chlorides and sulfates are monitored and controlled.

(4) Detection of Aging Effects: **Demineralized water and** CST chemistry activities mitigate the onset and propagation of loss of material, cracking, and reduction of heat transfer aging effects. No credit is taken for detection of aging effects.

(5) Monitoring and Trending: **Demineralized water and** CST water is monitored weekly to assure that purity is maintained within acceptable limits based on EPRI guidelines. Samples are taken and analyzed, and data are trended. The frequency of sampling is based on EPRI TR-103515.

(6) Acceptance Criteria: Maximum levels for various contaminants are maintained below system specific limits based on EPRI TR-103515. The acceptance criteria include the following parameter limits: conductivity $\leq$1 μS/cm, chlorides $\leq$10 ppb, and sulfates $\leq$10 ppb.

(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 overall effectiveness of **the demineralized water and** CST chemistry activities is supported by the operating experience for systems that are influenced by **demineralized water and** CST water chemistry. There has been no loss of component intended function in systems for which **demineralized water and** CST chemistry activities have been employed. Water chemistry is maintained based on the recommendations of EPRI TR-103515. The EPRI recommendations have been developed based on industry experience, have been shown to be effective, and are adjusted as new information becomes available.

SUMMARY

The demineralized water and CST chemistry activities use preventive measures to manage aging effects in components of the RCIC, HPCI, CRD, core spray, **standby liquid control, demineralized water** and condensate storage systems exposed to condensate storage tank water. **These** chemistry activities monitor and control water chemistry parameters using PBAPS procedures and processes based on EPRI TR-103515, “BWR Water Chemistry Guidelines”.

Based on the use of industry guidelines and industry and PBAPS operating experience, there is reasonable assurance that the **demineralized water and** CST chemistry activities will continue to adequately manage the aging effects associated with systems and components exposed to **demineralized water and** condensate storage tank water so that the intended functions are maintained consistent with the current licensing basis for the period of extended operation.

REFERENCES

(1) EPRI TR-103515, "BWR Water Chemistry Guidelines", 2000 Revision.

The LRA Appendix B.1.13, "Standby Liquid Control System Surveillance Activities," will be deleted.

The following new activity will be added to confirm the effectiveness of the water chemistry programs in managing the effects of aging in the standby liquid control system:

B.3.3 One-Time Piping Inspection Activities

ACTIVITY DESCRIPTION

The one-time piping inspection activities will consist of a one-time inspection of selected system piping to verify the integrity of the piping and confirm the absence of identified aging effects. The inspections will be condition monitoring examinations intended to verify that existing environmental conditions are not causing material degradation that could result in a loss of intended functions.

EVALUATION AND TECHNICAL BASIS

(1) Scope of Activity: The scope of this activity includes piping inspections at a susceptible location in the following systems:

Standby Liquid Control System
Auxiliary Steam System
Plant Equipment and Floor Drain System
Service Water System
Radiation Monitoring

(2) Preventive Actions: The one-time system piping inspection activities will be condition monitoring activities that identify loss of material or cracking aging effects as applicable for the material and environment. No preventive or mitigating attributes will be associated with the one-time piping inspection activities.

(3) Parameters Monitored/Inspected: The one-time piping inspection activities will provide for a one-time inspection to determine whether there has been loss of material or cracking in the subject piping, as applicable for the system material and environment. The inspection activities will confirm the pressure boundary integrity of the piping system. Inspections are performed in accordance with the requirements of the American Society of Mechanical Engineers (ASME)

Code, by using volumetric nondestructive examination (NDE) methods.

(4) Detection of Aging Effects: The one-time piping inspection activities will be undertaken to provide reasonable assurance that there is no loss of material or cracking, as appropriate 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.

(5) Monitoring and Trending: Results of the one-time piping inspection activities will be evaluated. The scope and frequency of subsequent examinations will be based on the results of the initial inspections.

(6) Acceptance Criteria: The one-time piping inspection activities acceptance criteria will be used to ensure that there is no unacceptable loss of material or cracking, as applicable for the material and environment of the piping system. Apparent unacceptable indications of corrosion or cracking will be evaluated by further engineering analysis and if warranted, additional inspections performed. The inspection acceptance criteria will provide assurance that the minimum wall thickness requirements for the piping continue to be met during the period of extended operation.

(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 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 one-time piping inspection activities are new, and therefore, there is no operating history associated with these activities.

<u>SUMMARY</u>

The one-time piping inspection activities will consist of a one-time inspection of selected piping to verify the integrity of the piping system. The activities will be based upon the guidance provided in ASME Section V, 1989 Edition and will be implemented through a PBAPS procedure.

Based on PBAPS and industry experience and the use of industry guidance for conducting the inspection, there is reasonable assurance that the inspection activities will confirm the absence of significant aging effects, so that the intended functions are maintained consistent with the current licensing basis for the period of extended operation.

REFERENCES

(1) ASME Boiler and Pressure Vessel Code, 1989 Edition, Section V, "Nondestructive Examination", Subsection A, "Nondestructive Methods of Examination", Article 5, "Ultrasonic Examination Methods for Materials and Fabrication"
(2) ASME Boiler and Pressure Vessel Code, 1989 Edition, Section V, "Nondestructive Examination", Subsection B, "Documents Adopted by Section V", Article 23, "Ultrasonic Standards"

The Appendix A Section A.1.4 will be revised as shown to reflect the modified aging management activities:

A.1.4 Demineralized Water and Condensate Storage Tank Chemistry Activities

PBAPS **demineralized water and** condensate storage tank (CST) chemistry activities manage loss of material and cracking of components exposed to **demineralized water and** condensate storage tank water in the RCIC, HPCI, CRD, core spray**, standby liquid control, demineralized water** and condensate storage systems. In addition, CST chemistry activities manage reduction in heat transfer in the HPCI gland seal condenser, and the RCIC and HPCI turbine lubricating oil coolers. **The demineralized water and the** CST water are monitored periodically to assure that purity is maintained within pre-established limits. If parameter limits are exceeded, corrective actions are taken to restore parameters within the acceptable range. **These** chemistry activities provide reasonable assurance that intended functions of **in-scope** components exposed to **demineralized water and** CST water are not lost due to loss of material, cracking, or reduction of heat transfer aging effects.

The following new Appendix A Section is provided for the new one-time inspection activity:

A.3.3 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.

Appendix A.1.13 will be deleted.

LRA Table 3.3-4 will be revised as shown below to reflect the new aging management activities:

Table 3.3-4 Aging Management Review Results for Component Groups in the Standby Liquid Control System

Component Group	Component Intended Function	Environment	Materials of Construction	Aging Effect	Aging Management Activity
Casting and Forging • Pump Casing • Valve Bodies	• Pressure Boundary	Borated Water	Stainless Steel	Loss of Material	• ISI Program (B.1.8)
Casting and Forging • Pump Casing • Valve Bodies	• Pressure Boundary	Borated Water	Stainless Steel	Cracking	• ISI Program (B.1.8)
Casting and Forging • Valve Bodies	• Pressure Boundary	Borated Water	Stainless Steel	Loss of Material	• ***Demineralized Water Chemistry (B.1.4)*** • ***One-Time Inspection (B.3.3)***
Casting and Forging • Valve Bodies	• Pressure Boundary	Borated Water	Stainless Steel	Cracking	• ***Demineralized Water Chemistry*** (B.1.4) • ***One-Time Inspection (B.3.3)***
Casting and Forging • Valve Bodies	• Pressure Boundary	Reactor Coolant	Stainless Steel	Loss of Material	• RCS Chemistry (B.1.2) • ISI Program (B.1.8)
Casting and Forging • Valve Bodies	• Pressure Boundary	Reactor Coolant	Stainless Steel	Cracking	• RCS Chemistry (B.1.2) • ISI Program (B.1.8)
Casting and Forging • Pump Casing • Valve Bodies	• Pressure Boundary	Sheltered	Stainless Steel	None	• Not Applicable
Piping • Pipe • Tubing	• Pressure Boundary	Borated Water	Stainless Steel	Loss of Material	• ISI Program (B.1.8)
Piping • Pipe • Tubing	• Pressure Boundary	Borated Water	Stainless Steel	Cracking	• ISI Program (B.1.8)
Piping • Pipe	• Pressure Boundary	Borated Water	Stainless Steel	Loss of Material	• ***Demineralized Water Chemistry (B.1.4)*** • ***One-Time Inspection (B.3.3)***

Component Group	Component Intended Function	Environment	Materials of Construction	Aging Effect	Aging Management Activity
Piping • Pipe	• Pressure Boundary	Borated Water	Stainless Steel	Cracking	• ***Demineralized Water Chemistry (B.1.4)*** • ***One-Time Inspection (B.3.3)***
Piping • Pipe	• Pressure Boundary	Reactor Coolant	Stainless Steel	Loss of Material	• RCS Chemistry (B.1.2) • ISI Program (B.1.8)
Piping • Pipe	• Pressure Boundary	Reactor Coolant	Stainless Steel	Cracking	• RCS Chemistry (B.1.2) • ISI Program (B.1.8)
Piping • Pipe • Tubing	• Pressure Boundary	Sheltered	Stainless Steel	None	• Not Applicable
Piping Specialties • Thermowells	• Pressure Boundary	Borated Water	Stainless Steel	Loss of Material	• ISI Program (B.1.8)
Piping Specialties • Thermowells	• Pressure Boundary	Borated Water	Stainless Steel	Cracking	• ISI Program (B.1.8)
Piping Specialties • Thermowells	• Pressure Boundary	Sheltered	Stainless Steel	None	• Not Applicable
Vessel • Accumulators	• Pressure Boundary	Borated Water	Carbon Steel	Loss of Material	• ISI Program (B.1.8)
Vessel • Solution Tank	• Pressure Boundary	Borated Water	Stainless Steel	Loss of Material	• ***Demineralized Water Chemistry (B.1.4)*** • ***One-Time Inspection (B.3.3)***
Vessel • Solution Tank	• Pressure Boundary	Borated Water	Stainless Steel	Cracking	• ***Demineralized Water Chemistry (B.1.4)*** • ***One-Time Inspection (B.3.3)***
Vessel • Accumulators	• Pressure Boundary	Dry Gas	Carbon Steel	None	• Not Applicable
Vessel • Accumulators • Solution Tank	• Pressure Boundary	Sheltered	Carbon Steel, Stainless Steel	None	• Not Applicable

B1.13-2

Because borated water can induce corrosion and cracking at tank bottom due to the presence of chlorides, sulfates, and contaminants, discuss how the chemistry parameters of the tank are controlled and monitored periodically.

Response:

As described above, the chemistry parameters are controlled when preparing the sodium pentaborate solution. The sodium pentaborate solution provides a relatively mild environment whose pH is slightly basic. Only safety-related materials with very low levels of impurities are used. The demineralized water used to prepare the solution is subject to water chemistry control and monitoring, as described in the revised LRA Appendix B.1.4 water chemistry activity.

B1.13-3

(a) In addition to monitoring and controlling the borated water chemistry, has a one-time inspection been considered to verify the effectiveness of the chemistry control to manage loss of material and to verify the absence of cracking at the tank bottom?
Section VII.E2 of the GALL Report recommends a water chemistry AMP for managing SCC of the solution tank. The water chemistry AMP specifies periodic monitoring and control of chemical species and water quality which are not included in the subject AMP.

(b) Discuss the non-inclusion of periodic monitoring and control in this AMP, including possible verification of its effectiveness and whether it is consistent with the water chemistry AMP in GALL.

Response:

See the response to RAI B1.13-1, above.

B1.13-4

The staff is not certain as to the effectiveness of the standby liquid control system surveillance activities AMP. Is one of the purposes of the daily monitoring of the solution tank liquid level to verify the effectiveness of this AMP? If not, specify what other process is in place to verify the effectiveness of this AMP. Explain how daily monitoring of the liquid level would serve as an effective indicator for wall thinning in localized regions of the tank wall and/or bottom. What are the specific acceptance criteria for the change in tank liquid level? What specific corrective actions would be taken if those acceptance criteria were not met?

Response:

See the response to RAI B1.13-1, above.

B1.13-5

Section A.1.2.3.6 of NUREG-1800 (July 2001) states that acceptance criteria of the program and the basis should be described. Provide specific values for maximum acceptable level of conductivity, chlorides, and sulfates for controlling the borated water chemistry.

Response:

See the response to RAI B1.13-1, above.

B2.1 "Lubricating and Fuel Oil Quality Testing Activities"

B2.1-1

The activities for the detection of water and microbes have not been included in the program scope, which is one of the ten attributes of the AMP. State explicitly whether sampling and testing of fuel oil in the EDG and diesel driven fire pump fuel oil systems include enhancement activities for the detection of water and microbes. If so, include the implementation schedule for these enhancement activities in addition to including the schedule in Appendix A of the LRA.

Response:

The existing sampling method for the presence of water in the EDG fuel oil system is adequate and no enhancements were required. The sampling method for the presence of water in the diesel driven fire pump fuel oil system will be enhanced to improve the water detection capabilities. For both systems, the testing activities will be enhanced to include an analysis for the presence of microbes in any water detected.

LRA Appendix A.2.1 indicates that these activity enhancements will be implemented prior to the end of the initial operating license term for PBAPS.

B2.1-2

Periodic cleaning of a tank allows for removal of sediments, and periodic draining of water collected at the bottom of a tank minimizes the amount of water and the length of the contact time. These measures are effective in mitigating corrosion inside fuel oil tanks. Are these measures adopted in the AMP? If not, provide the basis for not including these mitigation measures. Are the EDG fuel oil tanks considered to be the most bounding for the carbon steel diesel driven fire pump fuel oil tanks? If so, provide the basis. If not, justify the basis for not performing internal inspections of the diesel driven fire pump fuel oil tanks. If EDG tank inspections and wall measurements indicate significant deterioration and/or significant wall thinning, what specific actions will be taken for the diesel driven fire pump fuel oil tanks?

Response:

Appendix B.2.1, "Lubricating and Fuel Oil Quality Testing Activities," includes oil sampling and testing activities to detect the presence of water and other detrimental contaminants in the oil. The sampling methods used will retrieve samples from the bottom of the Emergency Diesel Generator and diesel fire pump fuel storage tanks. Unacceptable water accumulation will be removed. In addition, this activity includes periodic draining of water from the bottom of the Emergency Diesel Generator day tanks. This aging management activity does not include periodic cleaning of oil tanks.

Periodic cleaning of oil tanks is performed as part of the Emergency Diesel Generator Inspection Activities (LRA Appendix B.2.4). The Emergency Diesel Generator fuel oil storage tanks are drained and cleaned every 10 years. Residual fuel oil and sludge is removed, 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 inside 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 (LRA Appendix B.2.10).

The bottom of the diesel driven fire pump fuel oil storage tank will be sampled for water every 92 days. 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 AMP for managing loss of material of the carbon steel tank in a fuel oil environment.

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. If EDG fuel oil storage tank inspections and wall measurements indicate significant deterioration and/or significant wall thinning, the condition will be documented on a Condition Report and the cause of the degradation will be determined. Generic implications to similar storage tanks would be considered and additional inspections performed as appropriate.

B2.1-3

The applicant described lubricating oil sample analyses to be performed periodically in accordance with an approved PBAPS procedure. ASTM provides an established industry standard. Is this approved PBAPS procedure consistent with ASTM procedures?

Response:

The PBAPS procedures for lubricating oil sampling and analysis do not specifically reference individual ASTM standards. However, the PBAPS lubricating oil analysis program is based on industry standard practices as described in ASTM D 6224-98, "Standard Practice for In-Service Monitoring of Lubricating Oil for Auxiliary Power Plant Equipment." This standard provides guidelines for sampling and testing, including individual ASTM test method when applicable.

B2.1-4

Corrosion may occur at locations in which contaminants may accumulate, such as tank bottoms. Accordingly, the effectiveness of the present AMP needs to ensure that significant degradation is not occurring and the component intended function would be maintained during the period of extended operation. Thickness measurement of tank bottom would be an acceptable verification program. The applicant should state clearly such a need for verification and cross-reference another of the applicant's AMP (B.2.4 Emergency Diesel Generator Inspection Activities) as the corresponding verification program.

Response:

The Emergency Diesel Generator fuel oil storage and day tanks, and the diesel driven fire pump fuel oil storage and day tanks, are periodically sampled to confirm that water and contaminants are not accumulating. This frequent sampling precludes long-term accumulation of contaminants at the bottom of these tanks. In addition to sampling, the Emergency Diesel Generator fuel oil storage and day tanks are periodically inspected as part of AMP B.2.4, "Emergency Diesel Generator Inspection Activities." This aging management activity is cross-referenced, with the Lubricating and Fuel Oil Quality Testing Activities, in LRA Table 3.3-16. The EDG inspection activity includes wall thickness measurements for the Emergency Diesel Generator fuel oil storage tanks. This inspection activity confirms the effectiveness of periodic sampling to prevent significant corrosion of the tank bottom.

B2.1-5

The staff found an inconsistency between the emergency diesel generator inspection activities AMP and the lubricating and fuel oil quality testing activities AMP. Why is the emergency diesel generator inspection activities AMP used together with the present AMP for components in the EDG system (fuel oil day tank and fuel oil storage tank, table 3.3-16 of the LRA), whereas the lubricating and fuel oil quality testing activities AMP is used alone for components in the fire protection system (fuel tank, table 3.3-7 of the LRA)? Should the UT and visual inspection activities described in B2.4 of the LRA be extended to be applied to components in systems other than the EDG?

Response:

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. If EDG fuel oil storage tank inspections and wall measurements indicate significant deterioration and/or significant wall thinning, the condition will be documented on a Condition Report and the cause of the degradation will be determined. Generic implications to similar storage tanks would be considered and additional inspections performed as appropriate.

Experience to date with the visual inspections of the Emergency Diesel Generator fuel oil day tanks and storage tanks has not revealed significant deterioration. In addition, experience with wall thickness measurements of the Emergency Diesel Generator fuel oil storage tanks has not revealed any significant wall thinning. Since the EDG tank inspections have validated the effectiveness of the fuel oil sampling activities, it is not considered necessary to perform internal visual inspections of the diesel driven fire pump fuel oil tanks.

B2.1-6

Section A.1.2.3.5 of NUREG-1800 states that it is necessary to confirm that the time for the next scheduled inspection will occur before a loss of SC intended function. Please provide the schedule for the lubricating oil and fuel oil analyses.

Response:

The Emergency Diesel Generator lubricating oil is sampled quarterly (every 92 days).

The Emergency Diesel Generator fuel oil is sampled and analyzed upon delivery to the station, prior to being delivered to on-site storage tanks.

The Emergency Diesel Generator main fuel oil storage tanks are sampled for water accumulation, with any accumulated water analyzed for microbes, every 31 days.

The Emergency Diesel Generator main fuel oil storage tanks are sampled for particulate contamination every 31 days.

The Emergency Diesel Generator fuel oil day tanks are sampled for water accumulation, with any accumulated water analyzed for microbes, every 31 days.

The Diesel Driven Fire Pump fuel oil is sampled and analyzed upon delivery to the station, prior to being delivered to on-site storage tanks.

The Diesel Driven Fire Pump fuel oil storage tank will be sampled for viscosity, sediment, and water accumulation, with any accumulated water analyzed for microbes, every 92 days (quarterly).

HPCI lubricating oil is sampled during the quarterly HPCI pump test.

RCIC lubricating oil is sampled during the quarterly RCIC pump test.

B2.1-7

Pore sizes of filters are used as a principal parameter in the determination of particulates. What is the pore size of the filter used in the testing procedures? Is it consistent with the latest applicable ASTM standards?

Response:

PBAPS Technical Specifications 5.5.9 requires the performance of particulate contamination determination in accordance with ASTM D2276, Method A, which specifies the use of a 0.8 micron pore size filter. The diesel generator manufacturer has verified that particulate matter less than 3.0 microns will not be harmful to the diesel. Therefore, the Technical Specifications allow the use of filters specified in the ASTM method to have a nominal pore size of up to 3 microns.

B2.1-8

The staff is not certain as to why the applicant is not using the updated ASTM standards. Provide the basis for using ASTM D2276-78 and D975-81 rather than ASTM D 2276-00 and D975-00, which are updated ASTM standards? If particular test procedures are used based on methods as documented in specific ASTM documents other than the ones quoted in the AMP these should be explicitly referenced.

Response:

Relevant plant procedures are not necessarily based on the latest applicable ASTM standards. ASTM Standards D2276-78 and D975-81 are used based on PBAPS Technical Specifications Surveillance Requirement 3.8.3.3 which is performed in accordance with Technical Specifications 5.5.9 requirements. In addition, the following ASTM standards are used in accordance with the Technical Specifications requirements:

- New fuel oil is sampled in accordance with ASTM D4057-81
- Fuel oil specific gravity is verified in accordance with ASTM D1298-80
- Fuel oil "clear and bright" verification is in accordance with ASTM D4176-82
- Sulfur analysis may be performed in accordance with ASTM D1552-79 or ASTM D2622-82.

B2.1-9

In the LRA, it is stated that minor contamination events such as sediment in the diesel driven fire pump fuel oil day tank (one event), water in the diesel driven fire pump fuel oil storage tank (two events), and water in the EDG fuel oil storage tanks (two events in 1988) have been detected and corrected in a timely manner. Are any of these events related to contaminations of the tank bottoms? These operating experiences suggest the need for an effective verification program to assure the effectiveness of the lubricating and fuel oil quality testing activities AMP. The staff is not certain whether there is a verification program in place to assure the effectiveness of this AMP. Please address.

Response:

The described events involve the discovery of contaminants (sediment and water) in the bottom of the identified fuel oil storage tanks. As stated in the LRA, water was found in the diesel driven fire pump fuel oil storage tank before the tank was relocated indoors. The existing underground diesel driven fire pump fuel oil storage tank was abandoned in place and a new fuel oil storage tank was installed indoors.

These events are not related to contaminations of the tank bottoms. These events were not caused by degradation of the tank bottoms, nor did these events result in degradation of the tank bottoms. The diesel driven fire pump fuel oil storage tank was replaced and relocated indoors to comply with Environmental Protection Agency regulations. The diesel driven fire pump fuel oil day tank is also located indoors. The EDG fuel oil storage tanks are buried tanks and are periodically drained, cleaned and inspected. The most recent inspections, performed in 1995 – 1996, indicated no significant loss of tank wall thickness.

In all of these events, the presence of sediment or water was discovered in a timely manner and removed. Timely detection and removal of these contaminants provides reasonable assurance that detrimental concentrations of contaminants are not present.

As stated in the response to RAI B2.1-4 (above), the Emergency Diesel Generator fuel oil storage and day tanks are periodically inspected as part of AMP B.2.4, "Emergency Diesel Generator Inspection Activities." The inspection activity includes wall thickness measurements for the Emergency Diesel Generator fuel oil storage tanks. The EDG fuel oil tanks are considered bounding for the carbon steel diesel driven fire pump fuel oil tanks, as discussed in the response to RAIs B2.1-2 and B2.1-5. These EDG tank inspection activities confirm the effectiveness of the lubricating and fuel oil quality testing activities AMP.

B2.2 "Boraflex Management Activities"

B2.2-1

Section A.1.2.3.5 of NUREG-1800 states that it is necessary to confirm that the time for the next scheduled inspection will occur before a loss of SC intended function. Do the trending and monitoring of the silica level in the spent fuel pool water include the use of the EPRI RACKLIFE predictive code or its equivalent? If so, what is the monitoring schedule? If not, provide the basis for excluding the use of this methodology or its equivalent.

Response:

Monitoring and trending of silica in the spent fuel pool is as described in the activity description of B.2.2, "Boraflex Management Activities." It consists of routinely sampling spent fuel pool water for silica levels and trending the results to establish if silica level in the pool is increasing. A sustained increasing trend in spent fuel pool water silica concentration would signal the potential of boraflex degradation.

The EPRI RACKLIFE computer model is used at PBAPS and is updated semi-annually. Its results are used to manage storage of spent fuel in the pool and to predict when in-situ areal density testing should be performed. The RACKLIFE computer model is considered a trending tool, which is not required for managing aging of boraflex. Monitoring of silica level in the pool water and periodically performing in-situ boron areal density testing provide effective means to manage the aging of boraflex without use of EPRI RACKLIFE.

B2.2-2

Is neutron attenuation (blackness) measurement used in conjunction with boron areal density measurement, or is the latter a replacement for the former? Blackness measurement is used as an indicator of gap formation arising from material shrinkage which does not necessarily involve loss of materials to the spent fuel pool water.

Response:

Boron areal density in-situ measurements provide data on gaps, as well as data on concentration of boron carbide remaining in boraflex panels. The measurements replace "blackness" measurements.

B2.2-3

Is the data on silica levels used independently from the measurement on the loss of boron area density? The amount of boron carbide released from the Boraflex panel is determined through direct measurement of boron areal density and these data may be correlated with the levels of silica present through the use of a predictive code such as RACKLIFE or other similar codes (see RAI B2.2-1). Detection of gaps through blackness testing supplements these procedures (see RAI B2.2-2).

Response:

Yes, the data on silica levels is used independently from the measurement on the loss of boron areal density. Silica levels are monitored for a sustained increasing trend which would signal potential degradation of boraflex. Silica is also used as an input to the EPRI RACKLIFE computer code.

B2.2-4

In the LRA it is stated that spent fuel pool silica data is trended and compared in an industry-wide EPRI database. The staff believes that using a predictive code to trend and analyze the spent fuel pool silica data is necessary. Is this trending and comparison done in conjunction with a predictive code?

Response:

Silica data is transmitted to EPRI periodically for analysis and trending. The results are compared with data from other licensees who participate in the collaborative boraflex research agreement with EPRI.

B2.8 "Generic Letter 89-13 Activities"

B2.8-1

Section A1.2.3.4, "Detection of Aging Effects," of NUREG-1800 (July 2001) states that a justification needs to be provided as to whether the techniques are adequate to detect aging effects before a loss of SC intended function. What type of visual inspection will be conducted (e.g., VT-1, etc.)?

Response:

The visual inspections are performed by qualified maintenance technicians in accordance with guidance provided in the maintenance procedures. There are no VT requirements in the procedures. Maintenance supervision is notified of any abnormal as-found conditions. Identified visual defects are further investigated, including NDE examinations, if appropriate. Components are inspected for presence of dirt and debris accumulation, with results of the inspections recorded and the components cleaned prior to reassembly.

B2.8-2

The staff believes that the Outdoor, Buried, and Submerged Component Inspection Activities AMP should cover the inspection of external protective coatings in the systems such as the HPSW and ESW containing raw water. If the inspection of external protective coatings is covered by this AMP, please include it; if not, explain the basis of not including this inspection of the external protective coatings of the HPSW and ESW systems in that AMP.

Response:

The Generic Letter 89-13 Activities AMP does not include inspection of external protective coatings. External protective coating inspections for components subject to external surface aging effects are included in the Outdoor, Buried and Submerged Component Inspection Activities AMP (LRA Appendix B.2.5). The Outdoor, Buried and Submerged Component Inspection Activities AMP is referenced in LRA Table 3.3-5 for HPSW System piping, valve bodies and pump casings. The Outdoor, Buried and Submerged Component Inspection Activities AMP is referenced in LRA Table 3.3-6 for ESW System piping, valve bodies and pump casings. The Outdoor, Buried and Submerged Component Inspection Activities AMP is referenced in LRA Table 3.3-7 for Fire Protection System piping, valve bodies and pump casings. This aging management activity, as described in LRA Appendix B.2.5, includes inspections of external surfaces for loss of material and cracking. Buried components are inspected for coating degradation, if coated.

B2.12 "Heat Exchanger Inspection Activities"

B2.12-1

The applicant did not provide enough information for the staff to evaluate this AMP. Provide a more detailed description of the PBAPS inspection procedures in regards to methodology, frequency of inspections, and parameters inspected/monitored.

Response:

The heat exchangers are opened and visually inspected for degradation due to loss of material, cracking, and reduction of heat transfer. They are cleaned and reassembled. A post maintenance test verifies operability. The component inspections are scheduled as part of the HPCI and RCIC turbine maintenance which is performed every 8 years.

B2.12-2

Section A1.2.3.4, "Detection of Aging Effects," of NUREG-1800 (July 2001) states that a justification needs to be provided as to whether the techniques are adequate to detect aging effects before a loss of SC intended function. It is indicated in the LRA that loss of material and cracking degradation are detected through component surface visual inspections of the HPCI and RCIC turbine lube oil coolers on the water side. At what levels (e.g., VT-1 etc.) would the visual inspection be conducted? In addition, the staff finds that the identified visual defects need to be further investigated, including NDE examinations if appropriate. Confirm that this will be done, or provide the basis for the decision not to further investigate these defects.

Response:

The visual inspections are performed by qualified maintenance technicians in accordance with inspection procedures. There is no VT requirement in the procedures. Maintenance supervision is notified of any abnormal as-found conditions. If the as-found conditions are outside of the expected condition, an evaluation is performed to determine the appropriate corrective action. Part of the evaluation may include NDE examinations, as warranted.

B2.12-3

Section A.1.2.3.5 of NUREG-1800 states that it is necessary to confirm that the time for the next scheduled inspection will occur before a loss of SC intended function. What is the schedule for the periodic component visual inspections and cleaning as part of the HPCI and RCIC turbine inspections? What is the justification for the inspection interval?

Response:

The HPCI and RCIC turbine maintenance is performed every 8 years. 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.

B2.12-4

The applicant stated that visual inspection would be conducted for fouling. However, no information is provided by the applicant in the acceptance criteria on fouling management. Does the acceptance criteria include effective cleaning of fouling in organisms and maintenance of the coating or lining?

Response:

During maintenance, the tubes are cleaned. Verification of effectiveness is accomplished by the turbine operability surveillance test. These components do not have a coating or lining.