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10CFR54

December 19, 2002

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: Amendment 1 to the Application for Renewed Operating Licenses

Reference: July 2, 2001 Letter from Jeffrey A. Benjamin to NRC Document Control Desk Regarding Application for Renewed Operating Licenses

Dear Sir/Madam:

The reference letter submitted an Application for Renewed Operating Licenses for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3, which provided information required by 10CFR54. Exelon Generation Company, LLC (Exelon) hereby submits Amendment 1 to the PBAPS License Renewal Application (LRA) in accordance with 10CFR54.21(b). Amendment 1 identifies changes to the current licensing basis (CLB) that materially affects the contents of the PBAPS LRA, including the UFSAR supplement. This Amendment is required to be submitted each year following submittal of the LRA and at least 3 months before scheduled completion of the LRA review by the NRC.

Attachment 1 provides a description of the changes and replacement pages of the PBAPS LRA that have been materially affected by changes to the CLB. Attachment 2 provides marked-up License Renewal Safety Evaluation Report with Open and Confirmatory Items pages to reflect the changes made to the PBAPS LRA. Attachment 3 provides information in response to your requests made in a telephonic discussion on December 4, 2002.

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 12-18-02 Michael P. Gallagher

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**

## 1.0 INTRODUCTION

The License Renewal Rule, 10CFR54.21(b), requires that each year following submittal of a license renewal application (LRA), an amendment must be submitted to identify changes to the facility current licensing basis (CLB) that materially impact the content of the LRA. In accordance with this requirement, Exelon Generation Company, LLC (Exelon) has completed the review of Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3, CLB changes since the submittal of the LRA. This attachment provides its results, and required revisions to the LRA.

## 2.0 REVIEW RESULTS

The review identified four (4) plant changes that, although minor, impact the LRA. The review did not identify new operating experience that affects the content of the LRA. Each change and its impact on the LRA are briefly discussed below.

- 10CFR50 Appendix K, Power Uprate Modification. This modification added new instrumentation and piping to increase feedwater system flow measurement accuracy in support of 1.62% power level increase, approved in Amendment Nos. 247 and 250 to the Facility Operating Licenses for Units 2 and 3, respectively. The existing feedwater discharge piping is carbon steel ASTM A-105, Grade B, known to be susceptible to Flow Accelerated Corrosion (FAC). The new feedwater system flow sample element body is alloy steel, ASTM A-217, Grade WC9 and the interfacing connections are alloy steel, ASTM A-182, Grade F22. These materials have greater resistance to FAC. Since LRA Table 3.4-3 does not list low alloy steel, this is considered a CLB change that materially impacts the content of the LRA and is required to be included in the LRA amendment. Table 3.4-3 is therefore revised to include low alloy steel. However, the aging effects applicable to carbon steel system piping are also applicable to the new materials. Consequently, the same aging management activities (AMA) credited for carbon steel are credited for the low alloy steel piping. A replacement Table 3.4-3 is provided below to show the new piping and piping specialties.

- Modifications to Emergency Diesel Generators (EDG) Gage Panel Pressure Switches. This modification added stainless steel isolation valves to instruments in the EDG gage panel to allow isolation of each individual instrument for testing purposes. The existing design is such that several instruments use a single isolation valve, i.e. the root valve, without any method of isolating them individually. As a result, testing of a single instrument requires several devices to be taken out of service, thereby making the diesel inoperable. In addition to stainless steel valves, the modification added stainless steel tubing and fittings, and flex hoses. The components are subject to lubricating and fuel oil, sheltered, wetted gas, and closed cooling water environments. The added stainless steel valve bodies and stainless steel tubing are susceptible to the same aging effects as the stainless steel tubing listed in Table 3.3-16. Aging management activities credited for managing the effects of aging of existing stainless steel components are also credited for the newly added components.

  Flex hoses consist of Teflon (Polytetrafluoroethylene or PTFE) tubing overbraid with stainless steel and stainless steel fittings. The stainless steel overbraid is subject to a sheltered environment and thus has no aging effect requiring aging management. The stainless steel fittings are included in the stainless steel tubing component category already listed in Table 3.3-16. For Teflon (PTFE) tubing, the aging management reviews concluded that the material has no aging effects, in EDG environments that require aging management. According to the flex hose manufacturer, Teflon (PTFE) tubing is subject to degradation when exposed to temperature below –65° F or above 450° F. The material is also known to degrade when exposed to high radiation or ultraviolet rays. The tubing is not exposed to these environments in the EDGs.

A replacement Table 3.3-16 is provided below to reflect new components added by the modification.

- Reactor Core Isolation Cooling System (RCIC) barometric discharge check valve replacement. This modification replaced an existing carbon steel valve with a stainless steel valve. The valve is subject to wetted gas and sheltered environments. LRA Table 3.2-4 was revised to add stainless steel valve bodies in a wetted gas environment. Aging management review determined that there are no aging effects requiring aging management for this material and environment combination. A replacement LRA page 3-43 for Table 3.2-4 is provided below to reflect this new component added by the modification.

- Changes to Chemistry Control Programs. Appendix A and B of the LRA identifies the activities that are credited for compliance with the License Renewal Rule for aging management of passive, long-lived components and structures within the scope of License Renewal. Aging Management Reviews (AMRs) developed in support of the PBAPS LRA provided further detail regarding the aging management activities identified in the LRA appendices.

  Chemistry control programs are credited in the aging management activities for a number of systems. Two Chemistry Control programs have had enhancements made to the Chemistry Limits in these programs to provide better control of the aging management process. The following Chemistry Control programs have changes to their chemistry limits:

  1. LRA App. A, Section A.1.3 and App. B, Section B.1.3, credit Closed Cooling Water (CCW) Chemistry Activities in managing the aging effects of cracking and loss of material. The following enhancements have been made to the CCW Chemistry Control Program Operational Limits:

     a) The LRA states that the pH of the CCW systems will be controlled between 8.5 to 10.5. The new control range for pH is now 9.0 to 10.4. This new control range is more restrictive and will minimize corrosion by raising the lower limit in the range. This new control range meets the requirements of the EPRI Closed Cooling Water Chemistry Guidelines (TR-107396).

     b) The LRA states that the nitrite concentration in the CCW systems will be controlled between 500 to 1100 ppb. The new control range for nitrite is now 600 to 1200 ppb. Raising the nitrite control range provides more chemical to assure that corrosion is minimized. This new control range meets the requirements of the EPRI Closed Cooling Water Chemistry Guidelines (TR-107396) and is below the maximum limit of 4000 ppb set by the EPRI Closed Cooling Water Chemistry Guidelines (TR-107396).

c) The LRA states that the Methylbenzyl Triazole (TTA) concentration in the CCW systems will be controlled between 5 to 30 ppb. The new control range for TTA is now 10 to 50 ppb. Raising the TTA control range provides more chemical to assure that corrosion is minimized. This new control range meets the requirements of the EPRI Closed Cooling Water Chemistry Guidelines (TR-107396). The EPRI Closed Cooling Water Chemistry Guidelines (TR-107396) sets no maximum limit.

2. LRA App. A, Section A.1.5 and App. B, Section B.1.5, credit Torus Water Chemistry Activities in managing the aging effects of cracking and loss of material. The following enhancement has been made to the Torus Water Chemistry Control Program Operational Limits:

a) The LRA states that the turbidity of the Torus Water systems will be controlled between 2 to 25 ntu. Turbidity is not a control parameter as specified in the EPRI BWR Chemistry Guidelines (TR-103515). Turbidity is normally in the range of 2 to 25 ntu. A new limit of $\leq$ 25 ntu has been set for turbidity. Removing the lower limit will not decrease the effectiveness of the aging management program for Torus Water.

## 3.0 Revisions To LRA

Revised pages to the LRA that reflect the changes described above are provided here. The ***italic and bold*** text identifies the required changes to the LRA.

LRA Replacement Page 3-43
Table 3.2-4 Aging Management Review Results for Component Groups in the Reactor Core Isolation Cooling System (Continued)

| | | | | | |
|---|---|---|---|---|---|
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Steam | Stainless Steel | Loss of Material | • RCS Chemistry (B.1.2)<br>• ISI Program (1) (B.1.8) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Torus Grade Water | Carbon Steel | Loss of Material | • Torus Water Chemistry (B.1.5) |
| Casting and Forging<br>• Turbine Casing | • Pressure Boundary | Wetted Gas | Alloy Steel | Loss of Material | • HPCI and RCIC Turbine Inspection (B.2.10) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Wetted Gas | Bronze | None | • Not Applicable |
| ***Casting and Forging***<br>• ***Valve Bodies*** | • ***Pressure Boundary*** | ***Wetted Gas*** | ***Stainless Steel*** | ***None*** | • ***Not Applicable*** |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Wetted Gas | Carbon Steel | Loss of Material | • Torus Piping Inspection (B.3.1) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Wetted Gas | Carbon Steel | Loss of Material | • ISI Program (B.1.8) |
| Heat Exchanger<br>• RCIC Turbine Lube Oil Cooler<br>(Tube) | • Pressure Boundary | Condensate Storage Water | Admiralty | Loss of Material | • CST Chemistry (B.1.4)<br>• Heat Exchanger Inspection (B.2.12)) |
| Heat Exchanger<br>• RCIC Turbine Lube Oil Cooler<br>(Tube) | • Pressure Boundary | Condensate Storage Water | Admiralty | Cracking | • CST Chemistry (B.1.4)<br>• Heat Exchanger Inspection (B.2.12) |
| Heat Exchanger<br>• RCIC Turbine Lube Oil Cooler<br>(Tube) | • Heat Transfer | Condensate Storage Water | Admiralty | Reduction of Heat Transfer | • CST Chemistry (B.1.4)<br>• Heat Exchanger Inspection (B.2.12) |

LRA Replacement Section 3.3.16 (LRA replacement pages 3-97 through 3-112)

## 3.3.16 Emergency Diesel Generator

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Closed Cooling Water | Aluminum | Loss of Material | • CCW Chemistry (B.1.3) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Closed Cooling Water | Brass | Loss of Material | • CCW Chemistry (B.1.3) |
| Casting and Forging<br>• Pump Casings<br>• Valve Bodies | • Pressure Boundary | Closed Cooling Water | Bronze | Loss of Material | • CCW Chemistry (B.1.3) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Closed Cooling Water | Carbon Steel | Loss of Material | • CCW Chemistry (B.1.3) |
| Casting and Forging<br>• Pump Casings | • Pressure Boundary | Closed Cooling Water | Cast Iron | Loss of Material | • CCW Chemistry (B.1.3) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Closed Cooling Water | Stainless Steel | Cracking | • CCW Chemistry (B.1.3) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Closed Cooling Water | Stainless Steel | Loss of Material | • CCW Chemistry (B.1.3) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Lubricating and Fuel Oil | Aluminum | Cracking | • Oil Quality Testing (B.2.1)<br>• Emergency Diesel Generator Inspection (B.2.4) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Lubricating and Fuel Oil | Aluminum | Loss of Material | • Oil Quality Testing (B.2.1)<br>• Emergency Diesel Generator Inspection (B.2.4) |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Lubricating and Fuel Oil | Aluminum Alloys | Cracking | • Oil Quality Testing (B.2.1)<br>• Emergency Diesel Generator Inspection (B.2.4) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Lubricating and Fuel Oil | Aluminum Alloys | Loss of Material | • Oil Quality Testing (B.2.1) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Lubricating and Fuel Oil | Brass | Cracking | • Oil Quality Testing (B.2.1)<br>• Emergency Diesel Generator Inspection (B.2.4) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Lubricating and Fuel Oil | Brass and Bronze | Loss of Material | • Oil Quality Testing (B.2.1)<br>• Emergency Diesel Generator Inspection (B.2.4) |
| Casting and Forging<br>• Valve Bodies<br>• Pump Casings<br>• Strainer Bodies<br>• Strainer Screens | • Pressure Boundary<br>• Filter (Strainer Screens Only) | Lubricating and Fuel Oil | Carbon Steel | Cracking | • Emergency Diesel Generator Inspection (B.2.4) |
| Casting and Forging<br>• Valve Bodies<br>• Pump Casings<br>• Strainer Bodies<br>• Strainer Screens | • Pressure Boundary<br>• Filter (Strainer Screens Only) | Lubricating and Fuel Oil | Carbon Steel | Loss of Material | • Oil Quality Testing (B.2.1) |
| Casting and Forging<br>• Valve Bodies<br>• Pump Casings<br>• Strainer Bodies | • Pressure Boundary | Lubricating and Fuel Oil | Cast Iron | Cracking | • Emergency Diesel Generator Inspection (B.2.4) |
| Casting and Forging<br>• Valve Bodies<br>• Pump Casings<br>• Strainer Bodies | • Pressure Boundary | Lubricating and Fuel Oil | Cast Iron | Loss of Material | • Oil Quality Testing (B.2.1) |
| ***Casting and Forging***<br>• ***Valve Bodies*** | • ***Pressure Boundary*** | ***Lubricating and Fuel Oil*** | ***Stainless Steel*** | ***Cracking*** | • ***Emergency Diesel Generator Inspection (B.2.4)*** |
| ***Casting and Forging***<br>• ***Valve Bodies*** | • ***Pressure Boundary*** | ***Lubricating and Fuel Oil*** | ***Stainless Steel*** | ***Loss of Material*** | • ***Oil Quality Testing (B.2.1)***<br>• ***Emergency Diesel Generator Inspection (B.2.4)*** |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Outdoor | Stainless Steel | None | • Not Applicable |
| Casting and Forging<br>• Pump Casings<br>• Valve Bodies<br>• Strainer Bodies | • Pressure Boundary | Sheltered | Brass and Bronze, Aluminum, Aluminum Alloys, Stainless Steel Carbon Steel, Cast Iron | None | • Not Applicable |
| Casting and Forging<br>• Strainer Screens | • Filter | Wetted Gas | Carbon Steel | None | • Not Applicable |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Wetted Gas | Carbon Steel | Loss of Material | • <u>Emergency Diesel Generator Inspection</u> (B.2.4) |
| ***Casting and Forging***<br>• ***Valve Bodies*** | • ***Pressure Boundary*** | ***Wetted Gas*** | ***Stainless Steel*** | ***Loss of Material*** | • ***<u>Emergency Diesel Generator Inspection</u> (B.2.4)*** |
| Casting and Forging<br>• Strainer Bodies | • Pressure Boundary | Wetted Gas | Cast Iron | Loss of Material | • <u>Emergency Diesel Generator Inspection</u> (B.2.4) |
| Elastomer<br>• Flexible Hoses | • Pressure Boundary | Closed Cooling Water | Neoprene and Rubber | Change in Material Properties | • <u>Emergency Diesel Generator Inspection</u> (B.2.4) |
| ***Elastomer***<br>• ***Flexible Hoses*** | • ***Pressure Boundary*** | ***Closed Cooling Water*** | ***Teflon (Stainless Steel Overbraid)*** | ***None*** | • ***Not Applicable*** |
| Elastomer<br>• Flexible Hoses | • Pressure Boundary | Lubricating and Fuel Oil | Neoprene and Rubber | Change in Material Properties | • <u>Emergency Diesel Generator Inspection</u> (B.2.4) |
| ***Elastomer***<br>• ***Flexible Hoses*** | • ***Pressure Boundary*** | ***Lubricating and Fuel Oil*** | ***Teflon (Stainless Steel Overbraid)*** | ***None*** | • ***Not Applicable*** |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Elastomer<br>• Flexible Hoses | • Pressure Boundary | Sheltered | Neoprene, Rubber, ***and Teflon (Stainless Steel Overbraid)*** | None | • Not Applicable |
| Elastomer<br>• Flexible Hoses | • Pressure Boundary | Wetted Gas | Neoprene | Change in Material Properties | • Emergency Diesel Generator Inspection (B.2.4) |
| ***Elastomer***<br>• ***Flexible Hoses*** | • ***Pressure Boundary*** | ***Wetted Gas*** | ***Teflon (Stainless Steel Overbraid)*** | ***None*** | • ***Not Applicable*** |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube) | • Pressure Boundary | Closed Cooling Water | Admiralty | Loss of Material | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube) | • Pressure Boundary | Closed Cooling Water | Admiralty | Cracking | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube) | • Heat Transfer | Closed Cooling Water | Admiralty | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8)<br>• CCW Chemistry (B.1.3) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube) | • Pressure Boundary | Closed Cooling Water | Admiralty | Loss of Material | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube) | • Pressure Boundary | Closed Cooling Water | Admiralty | Cracking | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube) | • Heat Transfer | Closed Cooling Water | Admiralty | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8)<br>• CCW Chemistry (B.1.3) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Shell and internals) | • Pressure Boundary | Closed Cooling Water | Carbon Steel | Loss of Material | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Shell and internals) | • Pressure Boundary | Closed Cooling Water | Carbon Steel | Cracking | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Shell and internals) | • Heat Transfer | Closed Cooling Water | Carbon Steel | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8)<br>• CCW Chemistry (B.1.3) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Shell and internals) | • Pressure Boundary | Closed Cooling Water | Carbon Steel | Loss of Material | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Shell and internals) | • Pressure Boundary | Closed Cooling Water | Carbon Steel | Cracking | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Shell and internals) | • Heat Transfer | Closed Cooling Water | Carbon Steel | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8)<br>• CCW Chemistry (B.1.3) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube Sheet) | • Pressure Boundary | Closed Cooling Water | Muntz Metal | Loss of Material | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube Sheet) | • Pressure Boundary | Closed Cooling Water | Muntz Metal | Cracking | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube Sheet) | • Heat Transfer | Closed Cooling Water | Muntz Metal | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8)<br>• CCW Chemistry (B.1.3) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube Sheet) | • Pressure Boundary | Closed Cooling Water | Muntz Metal | Loss of Material | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube Sheet) | • Pressure Boundary | Closed Cooling Water | Muntz Metal | Cracking | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube Sheet) | • Heat Transfer | Closed Cooling Water | Muntz Metal | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8)<br>• CCW Chemistry (B.1.3) |
| Heat Exchanger<br>• EDG Jacket Coolant Standby water Heater (Casing) | • Pressure Boundary | Closed Cooling Water | Carbon Steel | Loss of Material | • CCW Chemistry (B.1.3) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube) | • Pressure Boundary | Lubricating Oil | Admiralty | Loss of Material | • Oil Quality Testing (B.2.1)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube) | • Pressure Boundary | Lubricating Oil | Admiralty | Cracking | • GL 89-13 Activities (B.2.8)<br>• Oil Quality Testing (B.2.1) |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube) | • Heat Transfer | Lubricating Oil | Admiralty | Reduction of Heat Transfer | • Oil Quality Testing (B.2.1)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Cooler<br>(Shell, Baffles, and Tube Supports) | • Pressure Boundary | Lubricating Oil | Carbon Steel | Loss of Material | • Oil Quality Testing (B.2.1)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Shell, Baffles, and Tube Supports) | • Pressure Boundary | Lubricating Oil | Carbon Steel | Cracking | • GL 89-13 Activities (B.2.8)<br>• Oil Quality Testing (B.2.1) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Shell, Baffles, and Tube Supports) | • Heat Transfer | Lubricating Oil | Carbon Steel | Reduction of Heat Transfer | • Oil Quality Testing (B.2.1)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube Sheet) | • Pressure Boundary | Lubricating Oil | Muntz Metal | Loss of Material | • Oil Quality Testing (B.2.1)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube Sheet) | • Pressure Boundary | Lubricating Oil | Muntz Metal | Cracking | • GL 89-13 Activities (B.2.8)<br>• Oil Quality Testing (B.2.1) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube Sheet) | • Heat Transfer | Lubricating Oil | Muntz Metal | Reduction of Heat Transfer | • Oil Quality Testing (B.2.1)<br>• GL 89-13 Activities (B.2.8) |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Heat Exchanger<br>• EDG Lube Oil Standby Heater (Casing) | • Pressure Boundary | Lubricating Oil | Carbon Steel | Loss of Material | • Oil Quality Testing (B.2.1) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube) | • Pressure Boundary | Raw Water | Admiralty | Loss of Material | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube) | • Pressure Boundary | Raw Water | Admiralty | Cracking | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube) | • Pressure Boundary | Raw Water | Admiralty | Flow Blockage | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube) | • Heat Transfer | Raw Water | Admiralty | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube) | • Pressure Boundary | Raw Water | Admiralty | Loss of Material | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube) | • Pressure Boundary | Raw Water | Admiralty | Cracking | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube) | • Pressure Boundary | Raw Water | Admiralty | Flow Blockage | • GL 89-13 Activities (B.2.8) |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube) | • Heat Transfer | Raw Water | Admiralty | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube) | • Pressure Boundary | Raw Water | Admiralty | Loss of Material | • Oil Quality Testing (B.2.1)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube) | • Pressure Boundary | Raw Water | Admiralty | Cracking | • Oil Quality Testing (B.2.1)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube) | • Pressure Boundary | Raw Water | Admiralty | Flow Blockage | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube) | • Heat Transfer | Raw Water | Admiralty | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Channel) | • Pressure Boundary | Raw Water | Cast Iron | Loss of Material | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Channel) | • Pressure Boundary | Raw Water | Cast Iron | Cracking | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Channel) | • Pressure Boundary | Raw Water | Cast Iron | Flow Blockage | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Channel) | • Heat Transfer | Raw Water | Cast Iron | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8) |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Channel) | • Pressure Boundary | Raw Water | Cast Iron | Loss of Material | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Channel) | • Pressure Boundary | Raw Water | Cast Iron | Cracking | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Channel) | • Pressure Boundary | Raw Water | Cast Iron | Flow Blockage | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Channel) | • Heat Transfer | Raw Water | Cast Iron | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Channel) | • Pressure Boundary | Raw Water | Cast Iron | Loss of Material | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Channel) | • Pressure Boundary | Raw Water | Cast Iron | Cracking | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Channel) | • Pressure Boundary | Raw Water | Cast Iron | Flow Blockage | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Channel) | • Heat Transfer | Raw Water | Cast Iron | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube Sheet) | • Pressure Boundary | Raw Water | Muntz Metal | Loss of Material | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube Sheet) | • Pressure Boundary | Raw Water | Muntz Metal | Cracking | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube Sheet) | • Pressure Boundary | Raw Water | Muntz Metal | Flow Blockage | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>(Tube Sheet) | • Heat Transfer | Raw Water | Muntz Metal | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube Sheet) | • Pressure Boundary | Raw Water | Muntz Metal | Loss of Material | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube Sheet) | • Pressure Boundary | Raw Water | Muntz Metal | Cracking | • CCW Chemistry (B.1.3)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube Sheet) | • Pressure Boundary | Raw Water | Muntz Metal | Flow Blockage | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Air Coolant Cooler<br>(Tube Sheet) | • Heat Transfer | Raw Water | Muntz Metal | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube Sheet) | • Pressure Boundary | Raw Water | Muntz Metal | Loss of Material | • Oil Quality Testing (B.2.1)<br>• GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube Sheet) | • Pressure Boundary | Raw Water | Muntz Metal | Cracking | • Oil Quality Testing (B.2.1)<br>• GL 89-13 Activities (B.2.8) |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube Sheet) | • Pressure Boundary | Raw Water | Muntz Metal | Flow Blockage | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Lube Oil Coolers<br>(Tube Sheet) | • Heat Transfer | Raw Water | Muntz Metal | Reduction of Heat Transfer | • GL 89-13 Activities (B.2.8) |
| Heat Exchanger<br>• EDG Jacket Coolant Cooler<br>• EDG Air Coolant Cooler<br>• Lube Oil Cooler<br>• EDG Jacket Coolant Standby Water Heater (casing)<br>• EDG Lube Oil Standby Heater (Casing) | • Pressure Boundary | Sheltered | Carbon Steel | None | • Not Applicable |
| Piping<br>• Pipe | • Pressure Boundary | Buried | Carbon Steel | Loss of Material | • Oil Quality Testing (B.2.1)<br>• Outdoor, Buried and Submerged Component Inspection (B.2.5) |
| Piping<br>• Pipe | • Pressure Boundary | Closed Cooling Water | Carbon Steel | Loss of Material | • CCW Chemistry (B.1.3) |
| Piping<br>• Pipe<br>• Tubing | • Pressure Boundary | Closed Cooling Water | Stainless Steel | Loss of Material | • CCW Chemistry (B.1.3) |
| Piping<br>• Pipe<br>• Tubing | • Pressure Boundary | Closed Cooling Water | Stainless Steel | Cracking | • CCW Chemistry (B.1.3) |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Piping<br>• Fittings | • Pressure Boundary | Lubricating and Fuel Oil | Brass,<br>Brass Alloys | Cracking | • Emergency Diesel Generator Inspection (B.2.4) |
| Piping<br>• Fittings | • Pressure Boundary | Lubricating and Fuel Oil | Brass,<br>Brass Alloys | Loss of Material | • Oil Quality Testing (B.2.1)<br>• Emergency Diesel Generator Inspection (B.2.4) |
| Piping<br>• Pipe | • Pressure Boundary | Lubricating and Fuel Oil | Carbon Steel | Cracking | • Emergency Diesel Generator Inspection (B.2.4) |
| Piping<br>• Pipe | • Pressure Boundary | Lubricating and Fuel Oil | Carbon Steel | Loss of Material | • Oil Quality Testing (B.2.1) |
| Piping<br>• Tubing | • Pressure Boundary | Lubricating and Fuel Oil | Copper,<br>Copper Alloys | Cracking | • Emergency Diesel Generator Inspection (B.2.4) |
| Piping<br>• Tubing | • Pressure Boundary | Lubricating and Fuel Oil | Copper,<br>Copper Alloys | Loss of Material | • Oil Quality Testing (B.2.1)<br>• Emergency Diesel Generator Inspection (B.2.4) |
| Piping<br>• Tubing | • Pressure Boundary | Lubricating and Fuel Oil | Stainless Steel | Cracking | • Emergency Diesel Generator Inspection (B.2.4) |
| Piping<br>• Tubing | • Pressure Boundary | Lubricating and Fuel Oil | Stainless Steel | Loss of Material | • Oil Quality Testing (B.2.1)<br>• Emergency Diesel Generator Inspection (B.2.4) |
| Piping<br>• Pipe | • Pressure Boundary | Outdoor | Carbon Steel | None | • Not Applicable |
| Piping<br>• Pipe<br>• Tubing<br>• Fittings | • Pressure Boundary | Sheltered | Carbon Steel,<br>Stainless Steel,<br>Brass Alloys,<br>Copper Alloys | None | • Not Applicable |
| Piping<br>• Pipe | • Pressure Boundary | Wetted Gas | Stainless Steel,<br>Carbon Steel | Loss of Material | • Emergency Diesel Generator Inspection (B.2.4) |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Piping Specialties<br>• Thermowells | • Pressure Boundary | Closed Cooling Water | Brass | Loss of Material | • CCW Chemistry (B.1.3) |
| Piping Specialties<br>• Thermocouple Cap | • Pressure Boundary | Closed Cooling Water | Brass | Loss of Material | • CCW Chemistry (B.1.3) |
| Piping Specialties<br>• Thermocouple Cap | • Pressure Boundary | Closed Cooling Water | Cast Iron | Loss of Material | • CCW Chemistry (B.1.3) |
| Piping Specialties<br>• Restricting Orifices | • Pressure Boundary | Closed Cooling Water | Stainless Steel | Loss of Material | • CCW Chemistry (B.1.3) |
| Piping Specialties<br>• Restricting Orifices | • Pressure Boundary | Closed Cooling Water | Stainless Steel | Cracking | • CCW Chemistry (B.1.3) |
| Piping Specialties<br>• Expansion Joints | • Pressure Boundary | Closed Cooling Water | Stainless Steel | Loss of Material | • CCW Chemistry (B.1.3) |
| Piping Specialties<br>• Expansion Joints | • Pressure Boundary | Closed Cooling Water | Stainless Steel | Cracking | • CCW Chemistry (B.1.3) |
| Piping Specialties<br>• Expansion Joints<br>• Thermowells<br>• Thermowell Caps<br>• Restricting Orifice<br>• Drain Traps | • Pressure Boundary | Sheltered | Carbon Steel,<br>Cast Iron,<br>Brass,<br>Stainless Steel | None | • Not Applicable |
| Piping Specialties<br>• Drain Traps | • Pressure Boundary | Wetted Gas | Carbon Steel | Loss of Material | • Emergency Diesel Generator Inspection (B.2.4) |
| Piping Specialties<br>• Expansion Joints | • Pressure Boundary | Wetted Gas | Carbon Steel | Loss of Material | • Emergency Diesel Generator Inspection (B.2.4)) |
| Vessel<br>• Expansion Tank | • Pressure Boundary | Closed Cooling Water | Carbon Steel | Loss of Material | • CCW Chemistry (B.1.3) |
| Vessel<br>• Fuel Oil Day Tank | • Pressure Boundary | Fuel Oil | Carbon Steel | Loss of Material | • Oil Quality Testing (B.2.1)<br>• Emergency Diesel Generator Inspection (B.2.4)) |
| Vessel<br>• Fuel Oil Storage Tank | • Pressure Boundary | Fuel Oil,<br>Buried | Carbon Steel | Loss of Material | • Oil Quality Testing (B.2.1)<br>• Emergency Diesel Generator Inspection (B.2.4) |
| Vessel<br>• Lubricating Oil Tank | • Pressure Boundary | Lubricating Oil | Carbon Steel | None | • Not Applicable |

Table 3.3-16 Aging Management Review Results for Component Groups for the Emergency Diesel Generator (Continued)

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Vessel<br>• Lubricating Oil Tank<br>• Expansion Tank<br>• Fuel Oil Day Tank<br>• Air Receivers<br>• Silencers | • Pressure Boundary | Sheltered | Carbon Steel | None | • Not Applicable |
| Vessel<br>• Air Receivers | • Pressure Boundary | Wetted Gas | Carbon Steel | Loss of Material | • Emergency Diesel Generator Inspection (B.2.4) |
| Vessel<br>• Silencers | • Pressure Boundary | Wetted Gas | Carbon Steel | Loss of Material | • Emergency Diesel Generator Inspection (B.2.4) |

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## 3.4.3 Feedwater System

Table 3.4-3 Aging Management Review Results for Component Groups in the Feedwater System

| Component Group | Component Intended Function | Environment | Materials of Construction | Aging Effect | Aging Management Activity |
|---|---|---|---|---|---|
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Reactor Coolant | Carbon Steel | Loss of Material | • RCS Chemistry (B.1.2)<br>• ISI Program (1) (B.1.8) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Reactor Coolant | Stainless Steel | Cracking | • RCS Chemistry (B.1.2) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Reactor Coolant | Stainless Steel | Loss of Material | • RCS Chemistry (B.1.2) |
| Casting and Forging<br>• Valve Bodies | • Pressure Boundary | Sheltered | Carbon Steel, Stainless Steel | None | • Not Applicable |
| Piping<br>• Pipe | • Pressure Boundary | Reactor Coolant | Carbon Steel, ***Low alloy Steel*** | Loss of Material | • RCS Chemistry (B.1.2)<br>• FAC Program (B.1.1)<br>• ISI Program (1) (B.1.8) |
| Piping<br>• Tubing | • Pressure Boundary | Reactor Coolant | Stainless Steel | Cracking | • RCS Chemistry (B.1.2) |
| Piping<br>• Tubing | • Pressure Boundary | Reactor Coolant | Stainless Steel | Loss of Material | • RCS Chemistry (B.1.2) |
| Piping<br>• Pipe<br>• Tubing | • Pressure Boundary | Sheltered | Carbon Steel, Stainless Steel | None | • Not Applicable |
| Piping Specialties<br>• Flow Elements | • Pressure Boundary | Reactor Coolant | Carbon Steel, ***Low alloy Steel*** | Loss of Material | • RCS Chemistry (B.1.2)<br>• FAC Program (B.1.1) |
| Piping Specialties<br>• Thermowell | • Pressure Boundary | Reactor Coolant | Carbon Steel, ***Low alloy Steel*** | Loss of Material | • RCS Chemistry (B.1.2) |
| Piping Specialties<br>• Flow Elements<br>• Thermowells | • Pressure Boundary | Sheltered | Carbon Steel, ***Low alloy Steel*** | None | • Not Applicable |

(1) The ISI Program is credited only for the Class 1 piping or components in the component group.

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## B.1.3 Closed Cooling Water Chemistry

### ACTIVITY DESCRIPTION

PBAPS closed cooling water (CCW) chemistry activities consist of preventive measures that are used to manage loss of material, cracking, and reduction of heat transfer in components exposed to a closed cooling water environment. CCW chemistry activities provide for monitoring and controlling of CCW chemistry using PBAPS procedures and processes based on EPRI TR-107396, "Closed Cooling Water Chemistry Guidelines."

### EVALUATION AND TECHNICAL BASIS

***(1) Scope of Activity:*** CCW chemistry activities manage loss of material and cracking in systems and portions of systems within the emergency diesel generator and primary containment isolation systems subject to a closed cooling water environment by monitoring and controlling detrimental contaminants, and maintaining corrosion inhibitors to minimize corrosion. CCW chemistry activities also manage reduction of heat transfer in the EDG air coolant coolers and the EDG jacket coolant coolers.

***(2) Preventive Actions:*** CCW chemistry activities include periodic monitoring and controlling of corrosion inhibitor concentrations within specified limits of EPRI TR-107396 to minimize corrosion and protect metal surfaces. Maintaining the system corrosion inhibitor concentration within the pre-established limits provides reasonable assurance that the aging effects of loss of material, cracking, and reduction of heat transfer are managed.

***(3) Parameters Monitored/Inspected:*** The CCW chemistry monitoring and controlling activities minimize the aggressiveness of this environment. CCW chemistry is maintained per the recommendations of EPRI TR-107396. Nitrite, pH and methylbenzyl triazole (TTA) levels are monitored as chemistry control parameters. Chlorides, sulfates, nitrate, turbidity and metals are monitored on a regular basis as diagnostic parameters to provide indication of abnormal conditions. If parameter limits are exceeded, the chemistry control procedures require that corrective action be taken to restore parameters to within the acceptable range. Maintenance of corrosion inhibitor levels within EPRI TR-107396 guidelines mitigates loss of material, cracking, and reduction of heat transfer.

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

***(5) Monitoring and Trending:*** CCW chemistry is monitored to ensure corrosion inhibitors are being maintained within acceptable limits in accordance with EPRI guidelines. Samples are taken and analyzed, and data are trended. The frequency of sampling is based on EPRI TR-107396.

***(6) Acceptance Criteria:*** Levels for concentration of nitrite and TTA are maintained within the limits specified in the EPRI TR-107396. Parameters maintained in CCW systems include ***pH (9.0 – 10.4), Nitrite (600 – 1200 ppm), and TTA (10 – 50 ppm).***

***(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 industry operating experience demonstrates that the use of corrosion inhibitors in closed cooling water systems that are monitored and maintained by CCW chemistry activities is effective in mitigating loss of material, cracking, and reduction of heat transfer. No age related failures have occurred in the components within the scope of license renewal that are covered by PBAPS CCW chemistry activities.

## SUMMARY

PBAPS CCW chemistry activities manage loss of material and cracking in components exposed to a closed cooling water environment. CCW chemistry activities provide for monitoring and controlling of CCW chemistry using PBAPS procedures and processes based on EPRI TR-107396, "Closed Cooling Water Chemistry Guidelines".

Based on the use of industry guidelines and PBAPS operating experience, there is reasonable assurance that the PBAPS CCW chemistry activities will continue to adequately manage the aging effects of loss of material, cracking, and reduction of heat transfer in components exposed to a CCW environment so that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

## REFERENCES

(1) EPRI TR-107396, "Closed Cooling Water Chemistry Guidelines", October 1997

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## B.1.5 Torus Water Chemistry Activities

### ACTIVITY DESCRIPTION

Torus water chemistry activities consist of preventive measures that are used to manage aging effects in components of the RHR, HPCI, RCIC, core spray and main steam systems exposed to torus grade water. Torus water chemistry activities provide for monitoring and controlling of torus water chemistry using PBAPS procedures and processes based on EPRI TR-103515, "BWR Water Chemistry Guidelines."

### EVALUATION AND TECHNICAL BASIS

***(1) Scope of Activity:*** Torus water chemistry activities manage loss of material and cracking in RHR, HPCI, RCIC, core spray and main steam system components exposed to a torus grade water environment. In addition, torus water chemistry activities manage cracking of stainless steel component supports submerged in torus grade water, and reduction of heat transfer in RHR heat exchangers. The aging effects are managed by monitoring and controlling detrimental contaminants in torus grade water.

***(2) Preventive Actions:*** Torus water chemistry activities include periodic monitoring and controlling of torus grade water chemistry to ensure that 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:*** Torus water 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:*** Torus grade water is monitored periodically 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 as specified in EPRI TR-103515. Parameters maintained include conductivity (< 5 μmho/cm), chloride (≤ 200 ppb), sulfate (≤ 200 ppb), total organic carbon (≤ 1000 ppb) and ***turbidity (≤ 25 ntu).***

***(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:*** Torus water chemistry is maintained per the recommendations of EPRI TR-103515 that have been developed based on industry experience and shown to be effective. These limits are adjusted as new information becomes available. Components containing a torus water environment within the scope of license renewal have not experienced any age related pressure boundary failure at PBAPS. There has been no age-related loss of function of a submerged stainless steel component support or RHR heat exchanger due to chemistry related degradation. Torus inspections conducted in 1997 revealed a decrease in the rate of corrosion of the torus structure in part due to improved torus water chemistry.

SUMMARY

Torus water chemistry activities consist of preventive measures that manage aging effects in components of the RHR, HPCI, RCIC, core spray and main steam systems exposed to torus grade water. Torus water chemistry activities monitor and control torus water chemistry using PBAPS procedures and processes based on EPRI TR-103515, "BWR Water Chemistry Guidelines".

Based on the use of industry guidelines and PBAPS operating experience, there is reasonable assurance that the torus water chemistry activities will continue to adequately manage the aging effects in components exposed to torus grade water so that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

REFERENCES

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

ATTACHMENT 2

discussed as part of **Open Item 3.0.3.6.2-1**, the staff requested that the applicant verify the effectiveness of the chemistry program through an inspection activity.

Acceptance Criteria: The applicant stated that levels for concentration of nitrite and TTA are maintained within the limits specified in EPRI TR-107396, "Closed Cooling Water Chemistry Guidelines." Parameters maintained in the CCW systems include pH (8.5-10.5), nitrite (500-1000 ppm), and TTA (5-30 ppm). The staff requested additional information on the acceptance criteria, as indicated in Section A1.2.3.6 of NUREG-1800 (July 2001) for chlorides, sulfates, nitrate, turbidity, and metals which are monitored on a regular basis as diagnostic parameters to provide indication of abnormal conditions.

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. **This is Confirmatory Item 3.0.3.3.2-1.**

If the sample analysis indicates a change, chemistry supervision is notified, the situation is evaluated, and adequate corrective actions are implemented. The staff found the acceptance criteria to be acceptable because the information in the application and the applicant's responses to the staff are based on EPRI guidelines for closed cooling water chemistry.

Operating Experience: The CCW chemistry AMP is an existing program. The applicant stated that industry operating experience demonstrates that the use of corrosion inhibitors in closed cooling water systems that are monitored and maintained by CCW chemistry activities is effective in mitigating loss of material, cracking, and heat transfer reduction. No age-related failures have occurred in the components within the scope of license renewal that are covered by the PBAPS CCW chemistry AMP.

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. Therefore, the staff requested additional information on any operating experience related to component age degradation due to cracking and loss of material, or heat transfer reduction due to corrosion, occurring prior to age-related failures of the intended functions of the component. In addition, the staff requested the applicant to address the corrective actions performed prior to age-related failures. The applicant responded, in a letter to the NRC dated May 14, 2002, stating that the AMR of the operating experience did not identify any age-related degradation that required corrective action in the closed cooling water environment. The staff found that the aging management activities described above are based on plant and industry experience. The staff agreed that these activities are effective at these parameters acceptable because operating experience and the EPRI guidelines support the monitoring and control of these parameters to mitigate corrosion-related degradations and to ensure contaminants are not present in the torus water.

Detection of Aging Effects: The applicant stated that the torus water chemistry activities AMP mitigates the onset and propagation of loss of material and heat transfer reduction; however, detection of aging effects is not credited. The staff believes that there should be a one-time inspection to verify the effectiveness of the torus water chemistry control. Therefore, in RAI B1.5-2, the staff requested the applicant to clarify whether there is a one-time inspection included in this AMP. The applicant was requested to include a one-time inspection or explain the basis for not including a one-time inspection.

In a letter dated May 14, 2002, the applicant stated that the PBAPS has 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 the piping exposed to torus water is ASME Section XI Class 2 piping, which requires periodic inspections of welds and pressure tests to verify integrity. In addition, the FAC program provides for inspections of several susceptible locations of these systems to verify required wall thickness. The applicant found that the torus water chemistry activities are sufficient to adequately manage aging and that the routine inspections performed on the piping in the torus-grade water environment verify the effectiveness of the program. The staff found the applicant's response acceptable and agreed that this AMP does not have aging detection capability and that its function is to maintain a torus water chemistry environment that will minimize aging effects such as loss of material and cracking.

Monitoring and Trending: For the torus water chemistry activities AMP, the applicant indicated that periodic sampling measurements are taken and analyzed, and the data are trended. The frequency of sampling is based on EPRI TR-103515, which recommends sampling at least once every quarter. EPRI TR-103515 recommends increased frequencies if chemical ingress is detected or suspected. The staff found the frequency of sampling to be adequate in providing data for trending because it is based on an industry standard for early detection of chemistry deviations, allowing for timely corrective action. However, as discussed, as part of **Open Item 3.0.3.6.2-1**, the staff requested that the applicant verify the effectiveness of the chemistry program through an inspection activity.

Acceptance Criteria: The applicant stated that the specific limits of the torus water chemistry activities AMP are conductivity (< 5 µmho/cm), chlorides (< 200 ppb), sulfates (< 200 ppb), total organic carbon (< 1000 ppb) and turbidity (< 25 ntu). The minimum sampling frequency is quarterly. These parameters and their maximum levels and frequency of measurement are based on the values specified in EPRI TR-103515 for torus/pressure suppression pool. The staff found the applicant's acceptance criteria acceptable because they are consistent with the EPRI guideline which was developed based on operating experience and has been effective over time with widespread use.

The staff also noted that the system description of the HPCI in the UFSAR of the LRA indicates that the 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

- Outdoor, Buried, and Submerged Component Inspection Activities
- Condensate Storage Tank Chemistry

The Outdoor, Buried, and Submerged Component Inspection activities detect degradation due to loss of material or cracking of external surfaces for outdoor, buried, and submerged components. The program is implemented in accordance with PBAPS maintenance procedures and routine test procedures that provide instructions for visual inspections.

The Outdoor, Buried, and Submerged Component Inspection program and Condensate Storage Tank Chemistry Program are credited with managing the aging effects of several components in various different structures and systems and are, therefore, considered common aging management programs. The staff review of the common aging management programs is in Section 3.0 of this SER.

3.3.15.3 Conclusions

The staff reviewed the information in Section 3.3.15 and Table 3.3-15 of the LRA. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with the condensate storage system structures and components will be adequately managed so that there is reasonable assurance that this system will perform its intended functions in accordance with the CLB during the period of extended operation as required by 10 CFR 54.21(a)(3).

3.3.16 Emergency Diesel Generator

3.3.16.1 Technical Information in the Application

The four emergency diesel generators (EDGs) provide Class 1E electrical power to the emergency buses during a loss of offsite power (LOOP) or a LOCA coincident with a LOOP. The EDGs also support onsite power transfer from one offsite safeguard source to another by providing a parallel source of AC power to emergency buses during the transfer operation. Each EDG set consists of a diesel engine, a generator, and auxiliary systems (starting air, fuel oil, jacket cooling, air cooling, and lubricating oil). Each EDG is connected to one 4kV Class 1E emergency bus per unit and is automatically started on LOOP, low reactor water level, or high drywell pressure signals.

The components of the emergency diesel generators are described in Section 2.3.3.16 of the LRA as being within the scope of license renewal and subject to aging management review (AMR). The materials of construction within the EDGs are cast iron, carbon steel, bronze, Teflon (Poly-tetrafluoroethylene), copper alloys, aluminum, aluminum alloys, stainless steel, neoprene and rubber, brass, and brass alloys. Table 3.3-16 of the LRA lists the individual components of the system, including valve bodies, strainer screens, pump casings, pipe, tubing, fittings, strainer bodies, restricting orifices, flexible hoses, fuel oil day tanks, fuel oil storage tanks, lubricating oil tanks, EDG jacket coolant coolers, EDG air cooling coolers, EDG lube oil coolers, expansion joints, thermowells, thermowell caps, drain traps, the expansion tank, air receivers, and silencers.

3.3.16.1.1 Aging Effects

The applicant identified no aging effects for cast iron, carbon steel, bronze, copper alloys, Teflon, The applicant also identified no aging effects for Teflon in the closed cooling water, lubricating and fuel oil, and wetted gas environments.

~~aluminum~~, aluminum alloys, stainless steel, neoprene and rubber, brass and brass alloys in the sheltered environment and no aging effects for carbon steel components in the outdoor, wetted gas, and lubricating oil environments and stainless steel components in the outdoor environment. The applicant identified the following aging effects for various combinations of component materials and internal and external environments.

- cracking, loss of material, reduction in heat transfer, and flow blockage for cast iron in closed cooling water, lubricating and fuel oil, wetted gas, raw water environments
- cracking and loss of material for aluminum in closed cooling water and lubricating and fuel oil environments
- cracking and loss of material for aluminum alloys in the lubricating and fuel oil environment
- loss of material for bronze in closed cooling water and lubricating and fuel oil environments
- cracking, loss of material, and heat transfer reduction for carbon steel in closed cooling water, lubricating and fuel oil, buried, and wetted gas environments
- cracking and loss of material for stainless steel in closed cooling water, lubricating and fuel oil, and ~~wetted gas environments~~ loss of material in the
- cracking and loss of material for brass in closed cooling water and lubricating and fuel oil environments
- cracking and loss of material for brass alloys in the lubricating and fuel oil environment
- changes in material properties for neoprene and rubber in closed cooling water and lubricating and fuel oil environments
- change in material properties for neoprene in the wetted gas environment
- cracking and loss of material for copper and copper alloys in the lubricating and fuel oil environment
- cracking, loss of material, heat transfer reduction and flow blockage for admiralty in closed cooling water, lubricating oil, and raw water environments
- cracking, loss of material, heat transfer reduction, and flow blockage for muntz metal in closed cooling water, lubricating oil, and raw water

3.3.16.1.2 Aging Management Programs

The applicant credits the following AMPs to manage aging effects of the emergency diesel generators:

- Closed Cooling Water (CCW) Chemistry
- Outdoor, Buried, and Submerged Component Inspection
- Oil Quality Testing
- Emergency Diesel Generator Inspection
- GL 89-13 Activities

A description of these aging management programs is provided in Appendix B of the LRA. The applicant concludes that the effects of aging associated with the components in this system will be adequately managed by these aging management programs so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB during the period of extended operation.

the staff finds the applicant's response adequately addresses RAI 3.3-4..

3.3.16.2.2 Aging Management Programs

Section 2.3.3.16 and Table 3.3-16 of the LRA credit the following aging management programs for managing the aging effects in the emergency diesel generators:

- Closed Cooling Water (CCW) Chemistry
- Outdoor, Buried, and Submerged Component Inspection
- Oil Quality Testing
- Emergency Diesel Generator Inspection
- GL 89-13 Activities

CCW Chemistry, Outdoor, Buried, and Submerged Component Inspection, Oil Quality Inspection, and GL 89-13 Activities are credited with managing the aging effects of several components in various different structures and systems and are, therefore, considered common aging management programs. The staff review of the common aging management programs is in Section 3.0 of this SER. The staff evaluation of the EDG inspection AMP follows.

Emergency Diesel Generator Inspection AMP

The applicant described the emergency diesel generator (EDG) inspection AMP in Section B.2.4 of Appendix B to the LRA. The applicant credits this program with managing the effects of aging of EDG equipment that is within the scope of license renewal. The staff has reviewed Section B.2.4 of the LRA to determine whether the applicant has demonstrated that the effects of aging will be adequately managed by the program during the extended period of operation as required by 10 CFR 54.21(a)(3).

The EDG inspection activities provide for condition monitoring of in-scope EDG equipment that is exposed to a gaseous, closed cooling water or lubricating oil or fuel oil environment. Loss of material in the starting air system air receivers is mitigated by daily removal of any accumulation of condensate. Loss of material and cracking in lubricating oil and fuel oil systems is mitigated by periodic oil quality inspections. Visual inspections for change in material properties of neoprene and rubber flexible hoses in the starting air system and the cooling water system are performed in accordance with a plant procedure for periodic EDG maintenance. This procedure will be enhanced to require inspections of the lubricating oil and fuel oil system neoprene and rubber flexible hoses for change in material properties. The aging management of the loss of material in the EDG exhaust silencer will be enhanced by periodic disassembly, cleaning, and inspection of an automatic drain trap to ensure its functionality in preventing condensation buildup.

The staff's evaluation of the EDG inspection program focused on how the program manages the aging effect through the effective incorporation of the following 10 elements: program scope, preventive or mitigative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, corrective actions, confirmation process, administrative controls, and operating experience. The corrective actions, confirmation process, and administrative controls for license renewal are in accordance with the site-controlled quality assurance program pursuant to 10 CFR Part 50, Appendix B, and cover all structures and components that are subject to an aging management review. The applicant's quality assurance program is evaluated separately in Section 3.0.4 of this SER. This program satisfies the elements of corrective actions, confirmation process, and administrative controls. The remaining seven elements are discussed below.

Program Scope: The EDG inspection activities manage the aging effects of loss of material cracking, and change in material properties by—

- mitigating actions which ensure periodic removal of moisture from the starting air system air receivers
- periodic inspections of the EDG lubricating oil and fuel oil systems for loss of material and cracking
- periodic inspections of neoprene and rubber flexible hoses in the starting air and cooling water systems for change in material properties

The scope of the EDG inspection activities will be enhanced to—

- perform periodic inspections of EDG lubricating oil and fuel oil system neoprene and rubber flexible hoses for change in material properties
- periodically disassemble, clean, and inspect the EDG exhaust silencer drain trap to prevent condensation buildup and the resulting loss of material of the exhaust and silencer

The staff finds the program scope adequate and acceptable because the inspections cover all EDG components susceptible to aging effects under the scope of license renewal.

Preventive Actions: The EDG inspection activities provide mitigation methods to manage loss of material in the starting air system air receivers and the EDG exhaust silencer by ensuring periodic removal of moisture. The remaining EDG inspection activities provide inspection methods to identify aging effects, and thus have no preventive or mitigative attributes. The staff did not identify the need for additional preventative actions, and finds the preventive actions proposed by the applicant appropriate and acceptable.

Parameters Monitored or Inspected: The existing EDG inspection activities provide for—

- blowing down the EDG starting air system air receivers until no more moisture is present in the drain line
- performing visual inspections of the lubricating oil and fuel oil systems for the EDG fuel oil storage tanks for loss of material
- performing visual inspections of the starting air and cooling water system neoprene and rubber flexible hoses for change in material properties

EDG inspection activities will be enhanced to include—

- performance of visual inspections of the lubricating oil and fuel oil system neoprene and rubber flexible hoses for change in material properties
- periodic disassembly, cleaning, and inspection of the EDG exhaust silencer drain trap to ensure it is operating properly

The staff finds that the parameters monitored will permit timely detection of the aging effects and are, therefore, acceptable.

Detection of Aging Effects: The starting air system air receiver inspections and the periodic exhaust silencer automatic drain trap preventive maintenance activities mitigate potential aging effects. Visual inspections of the EDG fuel oil day tanks and the EDG lubricating and fuel oil system components and visual and UT inspections of the EDG fuel oil storage tanks are performed to assess loss of material and cracking aging effects. Visual inspection of neoprene and rubber flexible hoses provides for detection of change in material properties by observation of swelling or cracking. Peach Bottom procedures for EDG maintenance contain requirements for visual examinations of starting air and cooling water system neoprene and rubber flexible hoses. This procedure will be enhanced to include inspections of lubricating and fuel oil system neoprene and rubber flexible hoses. The staff finds that the proposed inspection techniques are consistent with industry practice and experience, are capable of detecting the relevant aging effects, and are, therefore, acceptable.

Monitoring and Trending: Existing EDG inspection activities provide the following monitoring and trending activities:

- Daily starting air system receiver inspections mitigate aging and require no monitoring or trending.
- EDG lubricating and fuel oil system examinations for loss of material and cracking are performed every 2 years for engine-mounted components and every 10 years for the EDG fuel oil storage tank and day tank interiors.
- Starting air and cooling water system neoprene and rubber flexible hose examinations for a change in material properties are conducted every 2 years.

Enhancements to EDG inspection activities will provide the following monitoring and trending activities:

- Examinations of the EDG lubricating and fuel oil system neoprene and rubber flexible hoses for a change in material properties will be conducted every 2 years.
- The periodic preventive maintenance of the EDG exhaust silencer automatic drain trap will mitigate aging and requires no monitoring or trending.

The staff finds this aspect of the inspection activities acceptable in that the monitoring and trending provides advance warning to permit corrective action before there is loss of intended function.

Acceptance Criteria: The EDG starting air system air receiver inspection contains the requirement to blow down the air receiver until there is no moisture in its drain line. Examinations for loss of material, visible cracking, and change in material properties aging effects are conducted in accordance with approved Peach Bottom procedures. Degraded components are repaired or replaced as required. The EDG exhaust silencer automatic drain trap preventive maintenance will ensure the trap is left in good working order. The staff finds the acceptance criteria acceptable because they are consistent with industry experience and practice.

Operating Experience: The overall effectiveness of the EDG inspection activities is supported by Peach Bottom's operating experience with the starting air, engine exhaust, cooling water, lubricating oil, and fuel oil systems. Minor leakage events in the starting air, engine exhaust, cooling water, lubricating oil, and fuel oil systems have been detected and corrected in a timely manner. Due to numerous small leaks, portions of the EDG exhaust piping have been condenser materials because no aging effects were identified as applicable to the main condenser. The above-identified main condenser materials have successfully performed as main condenser materials at other plants with no problems being reported. Further, the applicant has concluded that the main condenser must perform a significant pressure boundary function (maintain vacuum) to allow continued plant operation. The staff concurs with the applicant's conclusion that the main condenser does not require aging management because the main condenser integrity is continuously tested and confirmed during normal plant operation.

### 3.4.2.3 Conclusions

The staff has reviewed the information in Section 3.4, "Aging Management of Steam and Power Conversion Systems," of the LRA. On the basis of its review, the staff concludes that the applicant's assessment of the aging effects associated with the main condenser is consistent with published literature and industry experience. The staff further concludes that the applicant does not need aging management programs to manage the aging effects because the main condenser integrity is continuously confirmed during normal plant operation and thus the condenser post-accident function will be ensured consistent with the CLB throughout the extended period of operations.

## 3.4.3 Feedwater System

### 3.4.3.1 Technical Information in the Application

The Peach Bottom feedwater system receives its supply of water from the outlet of the condensate demineralizers during normal plant operation. The system consists of three feedwater heater strings (with cascading drains) connected in parallel, each consisting of five low-pressure feedwater heaters and one drain cooler in series. The feedwater heaters receive steam from the main turbine system and preheat feedwater before it enters the reactor feed pumps, thus increasing the heat cycle efficiency.

#### 3.4.3.1.1 Aging Effects

Table 3.4-3 of the LRA identified the following components as requiring aging management during the extended period of operation: piping, piping specialties, tubing, and valve bodies. The applicant identified carbon low alloy and stainless steel as the materials of construction for the feedwater components.

#### 3.4.3.1.2 Aging Management Programs

The LRA identified three aging management programs that will manage the aging effects on the main steam system during the extended period of operation:

- RCS Chemistry Program
- ISI Program
- FAC Program

3.4.3.2 Staff Evaluation

The staff has reviewed the information included in Section 3.4 of the LRA. The purpose of the review was to ascertain whether the applicant has adequately demonstrated that the effects of aging associated with the feedwater system will be adequately managed so that the intended function of the system will be maintained consistent with the CLB throughout the period of extended operation as required by 10 CFR 54.21(a)(3).

3.4.3.2.1 Aging Effects

The LRA included a summary of the results of the aging management review for the feedwater system. The results are listed in Table 3.4-3 of the LRA. The materials of construction, applicable environments, and aging effects for the feedwater system are as follows:

- carbon, low alloy, ~~and stainless~~ steel in a sheltered environment—no aging effects
- carbon and low alloy steel in a reactor coolant environment—loss of material
- stainless steel in a reactor coolant environment—cracking

No aging effects were identified by the AMR for piping, piping specialties, tubing, and valve bodies made of stainless steel, low alloy steel, or carbon steel in a sheltered environment. These materials are corrosion resistant in sheltered environments. The applicant, therefore, has not identified any applicable aging effects for the surfaces of stainless steel, low alloy steel, or carbon steel feedwater system components exposed to this environment.

Loss of material was identified for the carbon steel or low alloy steel piping, piping specialties, and valve bodies in a reactor coolant environment. Loss of material of carbon steel or low alloy steel by corrosion may occur in reactor coolant environment, and therefore may be an applicable aging effect for the carbon steel or low alloy steel surfaces exposed to reactor coolant water. The applicant will use the RCS chemistry program, ISI program, and FAC program to manage loss of material for carbon steel or low alloy steel piping, piping specialties, and valve bodies.

Cracking was identified for the stainless steel pipe, tubing, and valve bodies in a reactor coolant environment. Cracking of stainless steel materials may occur in reactor coolant environment, and therefore may be an applicable aging effect for the stainless steel surfaces exposed to reactor coolant. The applicant will use the RCS chemistry program to manage the loss of material associated with stainless steel pipe, tubing, and valve bodies in a reactor coolant environment.

3.4.3.2.2 Aging Management Programs

The applicant stated that the RCS chemistry program, ISI program, and FAC program will be used to manage the loss of material associated with carbon steel or low alloy steel piping, piping specialties, and valve bodies. The RCS chemistry program will be used to manage the loss of material associated with stainless steel pipe, tubing, and valve bodies in a reactor coolant environment. A detailed description of each of the programs identified above is included in Appendix B to the LRA, along with a demonstration that the identified aging effects will be effectively managed for the period of extended operation. The staff's detailed review of the different aging management activities and their ability to adequately manage the applicable aging effects is provided in Appendix B of this SER. As a result of its review, the staff did not identify any

ATTACHMENT 3

**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 **combined effects of license renewal and power uprate on** 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.

**Clarification to Open Item 2.3.3.19.2-1:**

In the response to this open item, a six-column table was added to provide the aging management review results for component groups in the reactor recirculation system that were added to the scope of license renewal as a result of non-safety-related to safety-related spatial interaction of SSC. For all of these component groups, the Reactor Coolant System Chemistry Program is the aging management activity that is relied upon to manage cracking and loss of material aging effects. For other portions of the reactor recirculation system in the scope of license renewal, a combination of the Reactor Coolant System Chemistry Program and the Inservice Inspection Program are the aging management activities relied upon to manage cracking and loss of material aging effects. For the portion of the reactor recirculation system that was added to the scope of license renewal as a result of non-safety-related to safety-related spatial interaction of SSC, why is there no inspection activity?

**Response:**

The portion of the reactor recirculation system that was added to the scope of license renewal as a result of non-safety-related to safety-related spatial interaction of SSC is associated with instrumentation piping. These components are not subject to the Inservice Inspection (ISI) Program because they are not safety-related. These components are exposed to reactor coolant beyond excess flow check valves, which are designed to prevent gross leakage. These instrument lines are less than one inch in diameter, are installed without butt welds, and are under reactor pressure. These lines, while not included in the ISI Program, are observed during hydrostatic pressure testing. Furthermore, the nuclear class 1 portion of the reactor recirculation system has components of similar size, material, and environment that rely upon the ISI Program as described in Appendix B.1.8 and Appendix A.1.8 for managing the aging effects of loss of material and cracking. The results of ISI Program inspections of the nuclear class 1 portion of the reactor recirculation system are representative of the condition of the non-safety-related reactor recirculation components and provide verification of the effectiveness of the Reactor Coolant System Chemistry activities. Any leakage would be identified and corrective actions taken in accordance with the corrective action program. Therefore, the aging effects for the portion of the reactor recirculation system that was added to the scope of license renewal as a result of non-safety-related to safety-related spatial interaction of SSC will be adequately managed.

**Clarification to Open Item 2.3.3.19.2-1:**

In the response to this open item, a six-column table was added to provide the aging management review results for component groups in the emergency service water system that were added to the scope of license renewal as a result of non-safety-related to safety-related spatial interaction of SSC. For all of these component groups, the component intended function is pressure boundary; the environment is raw water; the material of construction is plastic; and there are no aging effects. What is the specific type of material for each of the components? What is the basis for no aging management required?

**Response:**

The portion of the emergency service water (ESW) system that was added to the scope of license renewal as a result of non-safety-related to safety-related spatial interaction of SSC is associated with ESW corrosion monitoring. These components are located in the turbine building. The piping is made from polyvinyl chloride (PVC) schedule 80 to ASTM – D-1785 standards. The valves are made of chlorinated polyvinyl chloride (CPVC) and are rated at 225 psi. The piping is rated to 320 psi while the ESW system operating pressure is 150 psi. The portion of the ESW system that was added to the scope of license renewal as a result of non-safety-related to safety-related spatial interaction of SSC was installed in 1994. Aging of PVC and CPVC for a period of 40 years through the end of the extended period of operation will not result in a failure that prevents performance of a safety function. Therefore, no aging management activity is required.