From: <erachp@comcast.net>
To: Joe Zabel <JZabel@atlintl.com>, Mark Orr <MPOrr@atlintl.com>
Date: 08/02/2006 2:43:24 PM
Subject: AMR audit report section 3.3

Mark/Joe,
Attached is my section 3.3 input. This includes the input from LRA supplement 5, letter dated July 19, 2006. A couple of things to note:

1. I have identified in yellow highlight two places where a generic change should be made for all section 3 inputs.

2. I have two open items because the LRA Supplment 5 did not match the agreement made in the Q&A database. So, leave it as open item.

I suggest deleting section 3.3 from the shell and copy/paste the attached.

I will now work with Jim Medoff on section 4.3, TLAA input.

Erach

CC: Jim Davis <jad@nrc.gov>, Peter Wen <pxw@nrc.gov>, Ken Chang <kxc2@nrc.gov>

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3.3 Aging Management of Auxiliary Systems

This section of the audit and review report document the project team's review and evaluation of PNPS aging management review (AMR) results for those components in the auxiliary systems. The following systems are addressed in this section:

- standby liquid control system
- salt service water system
- reactor building closed cooling water system
- emergency diesel generator system
- station blackout diesel generator system
- security diesel
- fuel oil system
- instrument air system
- fire protection — water system
- fire protection — halon system
- heating, ventilation and air conditioning systems
- primary containment atmosphere control
- fuel pool cooling and fuel handling and storage systems
- miscellaneous systems in scope for 10 CFR 54.4(a)(2)

3.3.1 Summary of Technical Information in the Application

In the PNPS LRA Section 3.3, the applicant provides the results of its AMRs for the auxiliary systems components and component groups.

In PNPS LRA Table 3.3.1, "Summary of Aging Management Evaluations for the Auxiliary Systems Evaluated in Chapter VII of NUREG-1801," the applicant provides a summary comparison of its AMR line-items with the AMR line-items evaluated in the GALL Report for the auxiliary systems components and component groups. The applicant also identifies for each component type in the PNPS LRA Table 3.3.1 those components that are consistent with the GALL Report, those for which the GALL Report recommends further evaluation, and those components that are not addressed in the GALL Report together with the basis for their exclusion.

In the PNPS LRA Tables 3.3.2-1 through 3.3.2-14-35, the applicant provided a summary of the AMR results for component types associated with the following auxiliary systems:

- Standby Liquid Control (SLC) System
- Salt Service Water (SSW) Systems
- Reactor Building Closed Cooling Water (RBCCW) System
- Emergency Diesel Generator (EDG) System
- Station Blackout Diesel (SBO) System
- Security Diesel
- Fuel Oil (FO) System
- Instrument Air (IA) System
- Fire Protection — Water System
- Fire Protection — Halon System
- Heating, Ventilation and Air Conditioning (HVAC) Systems
- Primary Containment Atmosphere Control (PCAC) Systems

- Fuel Pool Cooling (FPC) and Fuel Handling and Storage Systems

Miscellaneous Systems in Scope for 10 CFR 54.4(a)(2) (Tables 3.3.2-14-1 to 3.3.2-14-35)

- Circulating Water System, Nonsafety-Related Components Affecting Safety-Related Systems (CWS)
- Compressed Air System, Nonsafety-Related Components Affecting Safety-Related Systems (CAS)
- Condensate System, Nonsafety-Related Components Affecting Safety-Related Systems
- Condensate Demineralizer (CDS), Nonsafety-Related Components Affecting Safety-Related Systems
- Condensate Storage and Transfer System, Nonsafety-Related Components Affecting Safety-Related Systems
- Control Rod Drive (CRD) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Core Spray (CS) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Emergency Diesel Generator (EDG) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Extraction Steam System, Nonsafety-Related Components Affecting Safety-Related Systems
- Feedwater System, Nonsafety-Related Components Affecting Safety-Related Systems
- Feedwater Heater Drains and Vents System, Nonsafety-Related Components Affecting Safety-Related Systems
- Fire Protection System, Nonsafety-Related Components Affecting Safety-Related Systems
- Fuel Oil (FO) Storage and Transfer System, Nonsafety-Related Components Affecting Safety-Related Systems
- Fuel Pool Cooling (FPC) and Demineralizer System, Nonsafety-Related Components Affecting Safety-Related Systems
- Heating, Ventilation and Air Conditioning (HVAC) Systems, Nonsafety-Related Components Affecting Safety-Related Systems
- High Pressure Coolant Injection (HPCI) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Main Condenser, Nonsafety-Related Components Affecting Safety-Related Systems
- Main Steam (MS) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Offgas and Augmented Offgas (AOG)System, Nonsafety-Related Components Affecting Safety-Related Systems
- Post-Accident Sampling (PASS) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Potable and Sanitary Water System, Nonsafety-Related Components Affecting Safety-Related Systems
- Primary Containment Atmospheric Control (PCAC) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Radioactive Waste System, Nonsafety-Related Components Affecting Safety-Related Systems

- Reactor Building Closed Cooling Water (RBCCW) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Reactor Core Isolation Cooling (RCIC) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Reactor Coolant (RCS) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Reactor Water Cleanup (RWCU) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Residual Heat Removal (RHR) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Salt Service Water (SSW) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Sampling Systems, Nonsafety-Related Components Affecting Safety-Related Systems
- Sanitary Soiled Waste and Vent; Plumbing and Drains, Nonsafety-Related Components Affecting Safety-Related Systems
- Screen Wash System, Nonsafety-Related Components Affecting Safety-Related Systems
- Standby Liquid Control (SLC) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Turbine Building Closed Cooling Water (TBCCW) System, Nonsafety-Related Components Affecting Safety-Related Systems
- Turbine Generator and Auxiliaries, Nonsafety-Related Components Affecting Safety-Related Systems

Specifically, the information for each component type includes intended function, material, environment, aging effect requiring management, AMPs, the GALL Report Volume 2 item, cross reference to the PNPS LRA Table 3.3.1 (Table 1), and generic and plant-specific notes related to consistency with the GALL Report.

The applicant's AMRs incorporates applicable operating experience in the determination of aging effect requiring managements (AERMs). These reviews include evaluation of plant-specific and industry operating experience. The plant-specific evaluation include reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience includes a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.3.2 Project Team Evaluation

The project team reviewed PNPS LRA Section 3.3 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the auxiliary systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The project team reviewed certain identified AMR line-items to confirm the applicant's claim that these AMR line-items were consistent with the GALL Report. The project team did not repeat its review of the matters described in the GALL Report. However, the project team did verify that the material presented in the PNPS LRA was applicable and that the applicant had identified the appropriate GALL Report AMR line-items. The project team's audit evaluation is

documented in Section 3.3.2.1 of this audit and review report. In addition, the project team's evaluations of the AMPs are documented in Section 3.0.3 of this audit and review report.

The project team reviewed those selected AMR line-items for which further evaluation is recommended by the GALL Report. The project team confirmed that the applicant's further evaluations were in accordance with the acceptance criteria in SRP-LR. The project team's audit evaluation is documented in Section 3.3.2.2 of this audit and review report.

The project team also reviewed of the remaining AMR line-items that were not consistent with or not addressed in the GALL Report. ~~based on NRC-approved precedents.~~ **(Joe, please make this generic change if applicable in all AMR sections).**The audit included evaluating whether all plausible aging effects were identified and whether the aging effects listed were appropriate for the combination of materials and environments specified. The project team's evaluation is documented in Section 3.3.2.3 of this audit and review report.

Finally, the project team reviewed the AMP summary descriptions in the UFSAR Supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the auxiliary systems.

The project team noted that the applicant has included all the 35 miscellaneous systems in scope for 10 CFR 54.4(a)(2) in section 3.3, Auxiliary systems in Tables 3.3.2-14-1 through 3.3.2-14-35. However, 4 of these systems are ESF systems and should have been included in section 3.2; and 10 of these systems are in Steam and Power Conversion (S&PC) systems and should have been included in section 3.4. The table 2s that apply to these 14 systems do reference Table 3.2.1 and Table 3.4.1 line items in the Table 1 line item reference column. This audit report and the SER preparation are based on systems as defined in NUREG-1800, SRP-LR, section 3.2, ESF systems, section 3.3, Auxiliary systems, and section 3.4, S&PC systems. The project team asked the applicant to justify why the non-safety related systems associated with ESF and S&PC systems were included in the Auxiliary systems section.

In its response, the applicant stated that the aging management review of the systems that have functions that met 10 CFR 54.4(a)(2) for physical interaction was done separately from the review of systems with intended functions that met 10 CFR 54.4(a)(1) or (a)(3). The results of the review were presented separately so that they could be reviewed separately on the basis of physical proximity rather than system function. This allows a reviewer which component types in a system were included in 10 CFR 54.4 (a)(2) for physical interaction. Since most of these systems are auxiliary systems they were added as part of the auxiliary system section.

The project team reviewed the response and discussed it further with the applicant. While the project team agreed that it made sense to have these systems identified in its own specific table, however, only 60% of these systems were auxiliary systems and since each system was identified in its own table, these tables should have been numbered and included in ESF or Auxiliary or S&PC system sections as appropriate for ease of preparation of audit report and SER and make these documents easier to understand. The audit report and the SER will split these tables and include them in their respective sections as follows:

Section 3.2 - Tables 3.3.2-14-7, 3.3.2-14-16, 3.3.2-14-25 and 3.3.2-14-28

Section 3.3 - Tables 3.3.2-14-2, 3.3.2-14-6, 3.3.2-14-8, 3.3.2-14-12 to 15, 3.3.2-14-19 to 24, 3.3.2-14-26, 3.3.2-14-27, and 3.3.2-14-29 to 34.

Section 3.4 - Tables 3.3.2-14-1, 3.3.2-14-3, 3.3.2-14-4, 3.3.2-14-5, 3.3.2-14-9, 3.3.2-14-10, 3.3.2-14-11, 3.3.2-14-17, 3.3.2-14-18 and 3.3.2-14-35.

Table 3.3-1 below provides a summary of the project team's evaluation of components, aging effects/aging mechanisms, and AMPs listed in LRA Section 3.3 that are addressed in the GALL Report. It also includes the section of the audit and review report in which the project team's evaluation is documented.

Table 3.3-1 Project Team Evaluation for Auxiliary Systems Components in the GALL Report

Item No.	Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Project Team Evaluation
3.3.1-1	Steel cranes - structural girders exposed to air - indoor uncontrolled (external)	Cumulative fatigue damage	TLAA to be evaluated for structural girders of cranes. See the Standard Review Plan, Section 4.7 for generic guidance for meeting the requirements of 10 CFR 54.21(c)(1).	Not used	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.1.
3.3.1-2	Steel and stainless steel piping, piping components, piping elements, and heat exchanger components exposed to air - indoor uncontrolled, treated borated water or treated water	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.1.
3.3.1-3	Stainless steel heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry and One-Time Inspection	None	Not applicable at PNPS. See audit report section 3.3.2.2.2.
3.3.1-4	Stainless steel piping, piping components, and piping elements exposed to sodium pentaborate solution > 60°C (> 140°F)	Cracking due to stress corrosion cracking	Water Chemistry and One-Time Inspection	None	Not applicable at PNPS. See audit report section 3.3.2.2.3, item 1.
3.3.1-5	Stainless steel and stainless clad steel heat exchanger components exposed to treated water > 60°C (> 140°F)	Cracking due to stress corrosion cracking	A plant specific aging management program is to be evaluated.	Water Chemistry Control - BWR Program One-Time Inspection Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.3, item 2.

3.3.1-6	Stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust	Cracking due to stress corrosion cracking	A plant specific aging management program is to be evaluated.	Periodic Surveillance and Preventive Maintenance Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.3, item 3.
3.3.1-7	PWR Only				
3.3.1-8	PWR Only				
3.3.1-9	PWR Only				
3.3.1-10	High-strength steel *closure bolting exposed* to air with steam or water leakage.	Cracking due to *stress corrosion* cracking, cyclic loading	Bolting Integrity *The AMP is to be* augmented by appropriate inspection to detect cracking if the bolts are not otherwise replaced during maintenance.	None	Not applicable at PNPS. PWR only.
3.3.1-11	Elastomer seals and components exposed to air - indoor uncontrolled (internal/external)	Hardening and loss of strength due to elastomer degradation	A plant specific aging management program is to be evaluated	Periodic Surveillance and Preventive Maintenance Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.5, item 1.
3.3.1-12	Elastomer lining exposed to treated water or treated borated water	Hardening and loss of strength due to elastomer degradation	A plant-specific aging management program is to be evaluated.	None	Not applicable at PNPS. See audit report section 3.3.2.2.5, item 2.
3.3.1-13	Boral, boron steel spent fuel storage racks neutron-absorbing sheets exposed to treated water or treated borated water	Reduction of neutron-absorbing capacity and loss of material due to general corrosion	A plant specific aging management program is to be evaluated	Water Chemistry Control - BWR Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.6.
3.3.1-14	Steel piping, piping component, and piping elements exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Oil Analysis Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.7, item 1.

3.3.1-15	Steel reactor coolant pump oil collection system piping, tubing, and valve bodies exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	None	Not applicable at PNPS. See audit report section 3.3.2.2.7, item 1.
3.3.1-16	Steel reactor coolant pump oil collection system tank exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection to evaluate the thickness of the lower portion of the tank	None	Not applicable at PNPS. See audit report section 3.3.2.2.7, item 1.
3.3.1-17	Steel piping, piping components, and piping elements exposed to treated water	Loss of material due to general, pitting, and crevice corrosion	Water Chemistry and One-Time Inspection	Water Chemistry Control - BWR Program One-Time Inspection Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.7, item 2. Also, see section 3.3.2.1.2 for bolting integrity program.
3.3.1-18	Stainless steel and steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust	Loss of material/general (steel only), pitting and crevice corrosion	A plant specific aging management program is to be evaluated	Periodic Surveillance and Preventive Maintenance Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.7, item 3.
3.3.1-19	Steel (with or without coating or wrapping) piping, piping components, and piping elements exposed to soil	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion	Buried Piping and Tanks Surveillance or Buried Piping and Tanks Inspection	Buried Piping and Tanks inspection Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.8. Also, see section 3.3.2.1.1 for bolting integrity program.
3.3.1-20	Steel piping, piping components, piping elements, and tanks exposed to fuel oil	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Fuel Oil Chemistry and One-Time Inspection	Diesel Fuel Monitoring Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.9, item 1.

3.3.1-21	Steel heat exchanger components exposed to lubricating oil	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Lubricating Oil Analysis and One-Time Inspection	Oil Analysis Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.9, item 2.
3.3.1-22	Steel with elastomer lining or stainless steel cladding piping, piping components, and piping elements exposed to treated water and treated borated water	Loss of material due to pitting and crevice corrosion (only for steel after lining/cladding degradation)	Water Chemistry and One-Time Inspection	None	Not applicable at PNPS. See audit report section 3.3.2.2.10, item 1.
3.3.1-23	Stainless steel and steel with stainless steel cladding heat exchanger components exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Water Chemistry Control - BWR Program One-Time Inspection Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.10, item 2.
3.3.1-24	Stainless steel and aluminum piping, piping components, and piping elements exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Water Chemistry Control - BWR Program One-Time Inspection Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.10, item 2.
3.3.1-25	Copper alloy HVAC piping, piping components, piping elements exposed to condensation (external)	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	System Walkdown Program Periodic Surveillance and Preventive Maintenance Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.10, item 3.
3.3.1-26	Copper alloy piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Oil Analysis Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.10, item 4.

3.3.1-27	Stainless steel HVAC ducting and aluminum HVAC piping, piping components and piping elements exposed to condensation	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	System Walkdown Program Periodic Surveillance and Preventive Maintenance Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.10, item 5. Also, see section 3.3.2.1.1 for bolting integrity program.
3.3.1-28	Copper alloy fire protection piping, piping components, and piping elements exposed to condensation (internal)	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Periodic Surveillance and Preventive Maintenance Program One-Time Inspection Program Instrument Air Quality Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.10, item 6.
3.3.1-29	Stainless steel piping, piping components, and piping elements exposed to soil	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	None	Not applicable at PNPS. See audit report section 3.3.2.2.10, item 7.
3.3.1-30	Stainless steel piping, piping components, and piping elements exposed to sodium pentaborate solution	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Water Chemistry Control - BWR Program One-Time Inspection Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.10, item 8.
3.3.1-31	Copper alloy piping, piping components, and piping elements exposed to treated water	Loss of material due to pitting, crevice, and galvanic corrosion	Water Chemistry and One-Time Inspection	Water Chemistry Control - BWR Program One-Time Inspection Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.11.
3.3.1-32	Stainless steel, aluminum and copper alloy piping, piping components, and piping elements exposed to fuel oil	Loss of material due to pitting, crevice, and microbiologically influenced corrosion	Fuel Oil Chemistry and One-Time Inspection	Diesel Fuel Monitoring Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.12, item 1.

3.3.1-33	Stainless steel piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting, crevice, and microbiologically influenced corrosion	Lubricating Oil Analysis and One-Time Inspection	Oil Analysis Program	Consistent with the GALL Report, which recommends further evaluation. See Audit Report Section 3.3.2.2.12, item 2.
3.3.1-34	Elastomer seals and components exposed to air - indoor uncontrolled (internal or external)	Loss of material due to Wear	A plant specific aging management program is to be evaluated.	None	Not applicable at PNPS. See audit report section 3.3.2.2.13.
3.3.1-35	PWR Only				
3.3.1-36	Boraflex spent fuel storage racks neutron-absorbing sheets exposed to treated water	Reduction of neutron-absorbing capacity due to boraflex degradation	Boraflex Monitoring	Boraflex Monitoring Program	Consistent with GALL Report
3.3.1-37	Stainless steel piping, piping components, and piping elements exposed to treated water > 60°C (> 140°F)	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking	BWR Reactor Water Cleanup System	Water Chemistry Control - BWR Program One-Time Inspection Program	Consistent with the GALL Report See Audit Report Section 3.3.2.1.2 for further discussion
3.3.1-38	Stainless steel piping, piping components, and piping elements exposed to treated water > 60°C (> 140°F)	Cracking due to stress corrosion cracking	BWR Stress Corrosion Cracking and Water Chemistry	Water Chemistry Control - BWR Program One-Time Inspection Program	Consistent with the GALL Report See Audit Report Section 3.3.2.1.16 for further discussion
3.3.1-39	Stainless steel BWR spent fuel storage racks exposed to treated water > 60°C (> 140°F)	Cracking due to stress corrosion cracking	Water Chemistry	None	Not applicable at PNPS. See audit report section 3.3.2.3, Aging Effect/Mechanism in Table 3.3.1 That Are Not Applicable for PNPS (**Joe, please include highlighted words in all Table 1s where section 3.x.2.3 is referenced**)

3.3.1-40	Steel tanks in diesel fuel oil system exposed to air - outdoor (external)	Loss of material due to general, pitting, and crevice corrosion	Aboveground Steel Tanks	System Walkdown Program	Consistent with the GALL Report See Audit Report Section 3.3.2.1.3 for further discussion
3.3.1-41	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity	None	Not applicable at PNPS. See audit report section 3.3.2.3, Aging Effect/Mechanism in Table 3.3.1 That Are Not Applicable for PNPS
3.3.1-42	Steel closure bolting exposed to air with steam or water leakage	Loss of material due to general corrosion	Bolting Integrity	Not used	See Audit Report section 3.3.2.1.1 for further discussion
3.3.1-43	Steel bolting and closure bolting exposed to air - indoor uncontrolled (external) or air - outdoor (External)	Loss of material due to general, pitting, and crevice corrosion	Bolting Integrity	System Walkdown Program	Consistent with the GALL Report. See Audit Report Section 3.3.2.1.1 for further discussion
3.3.1-44	Steel compressed air system closure bolting exposed to condensation	Loss of material due to general, pitting, and crevice corrosion	Bolting Integrity	Not used	See Audit Report section 3.3.2.1.1 for further discussion
3.3.1-45	Steel closure bolting exposed to air - indoor uncontrolled (external)	Loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity	None	See Audit Report section 3.3.2.1.1 for further discussion
3.3.1-46	Stainless steel and stainless clad steel piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water > 60°C (> 140°F)	Cracking due to stress corrosion cracking	Closed-Cycle Cooling Water System	Water Chemistry Control - Closed Cooling Water Program	Consistent with GALL Report
3.3.1-47	Steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	Closed-Cycle Cooling Water System	Water Chemistry Control - Closed Cooling Water Program	Consistent with GALL Report

3.3.1-48	Steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	Water Chemistry Control - Closed Cooling Water Program	Consistent with GALL Report
3.3.1-49	Stainless steel; steel with stainless steel cladding heat exchanger components exposed to closed cycle cooling water	Loss of material due to microbiologically influenced corrosion	Closed-Cycle Cooling Water System	Water Chemistry Control - Closed Cooling Water Program	Consistent with GALL Report
3.3.1-50	Stainless steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System	Water Chemistry Control - Closed Cooling Water Program	Consistent with GALL Report
3.3.1-51	Copper alloy piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	Water Chemistry Control - Closed Cooling Water Program	Consistent with GALL Report
3.3.1-52	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System	Water Chemistry Control - Closed Cooling Water Program	Consistent with GALL Report
3.3.1-53	Steel compressed air system piping, piping components, and piping elements exposed to condensation (internal)	Loss of material due to general and pitting corrosion	Compressed Air Monitoring	Instrument Air Quality Program One-Time Inspection Program	Consistent with the GALL Report. See Audit Report Section 3.3.2.1.8 for further discussion
3.3.1-54	Stainless steel compressed air system piping, piping components, and piping elements exposed to internal condensation	Loss of material due to pitting and crevice corrosion	Compressed Air Monitoring	Instrument Air Quality Program One-Time Inspection Program	Consistent with the GALL Report. See Audit Report Section 3.3.2.1.8 for further discussion
3.3.1-55	Steel ducting closure bolting exposed to air - indoor uncontrolled (external)	Loss of material due to general corrosion	External Surfaces Monitoring	System Walkdown Program	Consistent with the GALL Report. See Audit Report Section 3.3.2.1.1 for further discussion
3.3.1-56	Steel HVAC ducting and components external surfaces exposed to air - indoor uncontrolled (external)	Loss of material due to general corrosion	External Surfaces Monitoring	System Walkdown Program	Consistent with GALL Report

3.3.1-57	Steel piping and components external surfaces exposed to air - indoor uncontrolled (External)	Loss of material due to general corrosion	External Surfaces Monitoring	System Walkdown Program	Consistent with GALL Report
3.3.1-58	Steel external surfaces exposed to air - indoor uncontrolled (external), air - outdoor (external), and condensation (external)	Loss of material due to general corrosion	External Surfaces Monitoring	System Walkdown Program	Consistent with the GALL Report. See Audit Report Sections 3.3.2.1.1 and 3.3.2.1.4 for further discussion
3.3.1-59	Steel heat exchanger components exposed to air - indoor uncontrolled (external) or air -outdoor (external)	Loss of material due to general, pitting, and crevice corrosion	External Surfaces Monitoring	System Walkdown Program Periodic Surveillance and Preventive Maintenance Program	Consistent with the GALL Report. See Audit Report Section 3.3.2.1.9 for further discussion
3.3.1-60	Steel piping, piping components, and piping elements exposed to air - outdoor (external)	Loss of material due to general, pitting, and crevice corrosion	External Surfaces Monitoring	System Walkdown Program	Consistent with GALL Report
3.3.1-61	Elastomer fire barrier penetration seals exposed to air - outdoor or air - indoor uncontrolled	Increased hardness, shrinkage and loss of strength due to weathering	Fire Protection	Not used	See Audit Report Section 3.3.2.1.5 for further discussion
3.3.1-62	Aluminum piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion	Fire Protection	None	Not applicable at PNPS. See audit report section 3.3.2.3, Aging Effect/Mechanism in Table 3.3.1 That Are Not Applicable for PNPS
3.3.1-63	Steel fire rated doors exposed to air - outdoor or air - indoor uncontrolled	Loss of material due to Wear	Fire Protection	Not used	Evaluated in section 3.5
3.3.1-64	Steel piping, piping components, and piping elements exposed to fuel oil	Loss of material due to general, pitting, and crevice corrosion	Fire Protection and Fuel Oil Chemistry	Not used	See Audit Report Section 3.3.2.1.6 for further discussion
3.3.1-65	Reinforced concrete structural fire barriers - walls, ceilings and floors exposed to air - indoor uncontrolled	Concrete cracking and spalling due to aggressive chemical attack, and reaction with aggregates	Fire Protection and Structures Monitoring Program	Not used	Evaluated in section 3.5

3.3.1-66	Reinforced concrete structural fire barriers - walls, ceilings and floors exposed to air - outdoor	Concrete cracking and spalling due to freeze thaw, aggressive chemical attack, and reaction with aggregates	Fire Protection and Structures Monitoring Program	Not used	Evaluated in section 3.5
3.3.1-67	Reinforced concrete structural fire barriers - walls, ceilings and floors exposed to air - outdoor or air - indoor uncontrolled	Loss of material due to corrosion of embedded steel	Fire Protection and Structures Monitoring Program	Not used	Evaluated in section 3.5
3.3.1-68	Steel piping, piping components, and piping elements exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Fire Water System	Periodic Surveillance and Preventive Maintenance Program	Consistent with the GALL Report. See Audit Report Section 3.3.2.1.10 for further discussion
3.3.1-69	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion, and fouling	Fire Water System	Not used	Not consistent with GALL Report. Fire Water System at PNPS is considered to be treated water rather than raw water. See Audit Report Section 3.3.2.3.9 for further discussion
3.3.1-70	Copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling	Fire Water System	Not used	Not consistent with GALL Report. Fire Water System at PNPS is considered to be treated water rather than raw water. See Audit Report Section 3.3.2.3.9 for further discussion
3.3.1-71	Steel piping, piping components, and piping elements exposed to moist air or condensation (Internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Periodic Surveillance and Preventive Maintenance Program	Consistent with the GALL Report.
3.3.1-72	Steel HVAC ducting and components internal surfaces exposed to condensation (Internal)	Loss of material due to general, pitting, crevice, and (for drip pans and drain lines) microbiologically influenced corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	System Walkdown Program	Consistent with the GALL Report. See Audit Report Section 3.3.2.1.7 for further discussion

3.3.1-73	Steel crane structural girders in load handling system exposed to air - indoor uncontrolled (external)	Loss of material due to general corrosion	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Not used	Evaluated in section 3.5
3.3.1-74	Steel cranes - rails exposed to air - indoor uncontrolled (external)	Loss of material due to Wear	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Not used	Evaluated in section 3.5
3.3.1-75	Elastomer seals and components exposed to raw water	Hardening and loss of strength due to elastomer degradation; loss of material due to erosion	Open-Cycle Cooling Water System	Periodic Surveillance and Preventive Maintenance Program	Consistent with the GALL Report. See Audit Report Section 3.3.2.1.11 for further discussion
3.3.1-76	Steel piping, piping components, and piping elements (without lining/ coating or with degraded lining/coating) exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, fouling, and lining/coating degradation	Open-Cycle Cooling Water System	Service Water Integrity Program Periodic Surveillance and Preventive Maintenance Program	Consistent with the GALL Report. See Audit Report Section 3.3.2.1.12 for further discussion
3.3.1-77	Steel heat exchanger components exposed to raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System	None	Not applicable at PNPS. See audit report section 3.3.2.3, Aging Effect/Mechanism in Table 3.3.1 That Are Not Applicable for PNPS
3.3.1-78	Stainless steel, nickel alloy, and copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion	Open-Cycle Cooling Water System	Service Water Integrity Program Periodic Surveillance and Preventive Maintenance Program	Consistent with the GALL Report. See Audit Report Section 3.3.2.1.13 for further discussion. Also, see section 3.3.2.1.1 for bolting integrity program.

3.3.1-79	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion, and fouling	Open-Cycle Cooling Water System	Service Water Integrity Program Periodic Surveillance and Preventive Maintenance Program One-Time Inspection Program	Consistent with the GALL Report. See Audit Report Section 3.3.2.1.14 for further discussion
3.3.1-80	Stainless steel and copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion	Open-Cycle Cooling Water System	None	Not applicable at PNPS. See audit report section 3.3.2.3, Aging Effect/Mechanism in Table 3.3.1 That Are Not Applicable for PNPS
3.3.1-81	Copper alloy piping, piping components, and piping elements, exposed to raw water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System	Service Water Integrity Program Periodic Surveillance and Preventive Maintenance Program	Consistent with the GALL Report. See Audit Report Section 3.3.2.1.15 for further discussion
3.3.1-82	Copper alloy heat exchanger components exposed to raw water	Loss of material due to pitting, crevice, galvanic, and microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System	Service Water Integrity Program	Consistent with the GALL Report.
3.3.1-83	Stainless steel and copper alloy heat exchanger tubes exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System	Service Water Integrity Program	Consistent with the GALL Report.
3.3.1-84	Copper alloy > 15% Zn piping, piping components, piping elements, and heat exchanger components exposed to raw water, treated water, or closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	Selective Leaching Program	Consistent with the GALL Report.
3.3.1-85	Gray cast iron piping, piping components, and piping elements exposed to soil, raw water, treated water, or closed-cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	Selective Leaching Program	Consistent with the GALL Report.

3.3.1-86	Structural steel (new fuel storage rack assembly) exposed to air - indoor uncontrolled (external)	Loss of material due to general, pitting, and crevice corrosion	Structures Monitoring Program	Not used	Evaluated in Section 3.5
3.3.1-87	PWR Only				
3.3.1-88	PWR Only				
3.3.1-89	PWR Only				
3.3.1-90	PWR Only				
3.3.1-91	PWR Only				
3.3.1-92	Galvanized steel piping, piping components, and piping elements exposed to air - indoor uncontrolled	None	None	None	Not applicable at PNPS. See audit report section 3.3.2.3, Aging Effect/Mechanism in Table 3.3.1 That Are Not Applicable for PNPS
3.3.1-93	Glass piping elements exposed to air, air - indoor uncontrolled (external), fuel oil, lubricating oil, raw water, treated water, and treated borated water	None	None	No AEM or AMP	Consistent with the GALL Report.
3.3.1-94	Stainless steel and nickel alloy piping, piping components, and piping elements exposed to air - indoor uncontrolled (external)	None	None	No AEM or AMP	Consistent with the GALL Report.
3.3.1-95	Steel and aluminum piping, piping components, and piping elements exposed to air - indoor controlled (external)	None	None	No AEM or AMP	Consistent with the GALL Report.
3.3.1-96	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	No AEM or AMP	Consistent with the GALL Report.
3.3.1-97	Steel, stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	No AEM or AMP	Consistent with the GALL Report.
3.3.1-98	Steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to dried air	None	None	No AEM or AMP	Not applicable at PNPS. See audit report section 3.3.2.3, Aging Effect/Mechanism in Table 3.3.1 That Are Not Applicable for PNPS
3.3.1-99	PWR Only				

3.3.2.1 AMR Results That Are Consistent with The GALL Report

Summary of Information in the Application

For aging management evaluations that the applicant states are consistent with the GALL Report, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the PNPS LRA is acceptable.

In PNPS LRA Section 3.3.2.1, the applicant identified the materials, environments, aging effects requiring management, and aging management programs for the following auxiliary systems:

- Standby Liquid Control (SLC) System
- Salt Service Water (SSW) System
- Reactor Building Closed Cooling Water (RBCCW) System
- Emergency Diesel Generator (EDG) System
- Station Blackout Diesel (SBO) System
- Security Diesel
- Fuel Oil (FO) System
- Instrument Air (IA)
- Fire Protection — Water System
- Fire Protection — Halon System
- Heating, Ventilation and Air Conditioning (HVAC) Systems
- Primary Containment Atmosphere Control (PCAC) System
- Fuel Pool Cooling (FPC) and Fuel Handling and Storage Systems
- Miscellaneous Systems in Scope for 10 CFR 54.4(a)(2)

The aging management programs identified by the applicant for the above auxiliary systems are:

- Boraflex Monitoring (B.1.1)
- Buried Piping and Tank Inspection(B.1.2)
- Diesel Fuel Monitoring (B.1.10)
- Fire Protection (B.1.13.1)
- Fire Water System (B.1.13.2)
- Flow-Accelerated Corrosion (B.1.14)
- Heat Exchanger Monitoring (B.1.15)
- Instrument Air Quality (B.1.17)
- Oil Analysis (B.1.22)
- One-Time Inspection (B.1.23)
- Periodic Surveillance and Preventive Maintenance (B.1.24)
- Selective Leaching (B.1.27)
- Service Water Integrity (B.1.28)
- System Walkdowns (B.1.30)
- Water Chemistry Control - Auxiliary Systems (B.1.32.1)
- Water Chemistry Control - BWR (B.1.32.2)
- Water Chemistry Control - Closed Cooling Water (B.1.32.3)

Project Team Evaluation

The project team reviewed its assigned PNPS LRA AMR line-items to determine that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects for the components that are subject to an AMR.

3.3.2.1.1 Loss of material, loss of pre-load and cracking of carbon steel and stainless steel bolting in various external environments

The applicant does not include a Bolting Integrity Program in the PNPS LRA. Instead, the applicant credits alternate programs such as System Walkdown, Service Water Integrity and Buried Piping and Tanks Inspection programs. The GALL report AMP, XI.M18, "Bolting Integrity", provides several recommendations in the 10-element evaluation such as selection of bolting materials, use of lubricants and sealants, and additional recommendations of NUREG-1339. The alternate programs may be acceptable for inspection, however, they do not address the preventive actions. For section 3.3, this applies to Table 3.3.1, line items 19, 27, 42, 43, 44, 55, 58, 78, and 94. The project team asked the applicant to clarify how PNPS meets these recommendations or provide justification why a bolting integrity program should not be provided.

In its response, the applicant stated that a Bolting Integrity program will be developed that will address the aging management of bolting in the scope of license renewal. Also, a copy of the aging management program basis will be provided for review. The Bolting Integrity Program will be implemented prior to the period of extended operation in accordance with commitment 32. The LRA will be supplemented to include descriptions of Bolting Integrity Program in Appendices A and B and to identify where the program is applicable.

In a letter dated July 19, 2006 **(MLxxxxxxxxx)**, the applicant included B.1.33, Bolting Integrity Program. This program is consistent with the GALL Report AMP, XI.M18, "Bolting Integrity". This program covers bolting within the scope of license renewal, including: 1) safety-related bolting, 2) bolting for nuclear steam supply system (NSSS) component supports, 3) bolting for other pressure retaining components, including nonsafety-related bolting, and 4) structural bolting (actual measured yield strength >150 ksi). The aging management of reactor head closure studs is addressed by XI.M3, and is not included in this program. Therefore, the aging effects of component type of bolting in all mechanical systems, except reactor head closure studs, are managed by the Bolting Integrity Program, instead of any other programs identified in the LRA Table 3.x.2-2s. The evaluation of this program is documented in section 3.0.3.2.20 of this audit and review report. The project team reviewed the program and found it to be acceptable.

3.3.2.1.2 Cracking due to stress corrosion cracking, intergranular stress corrosion cracking

In the discussion section of Table 3.3.1, Item 3.3.1-37 of the PNPS LRA, the applicant stated that cracking of stainless steel components of the reactor water cleanup system exposed to treated water >60°C (140°F) is managed by the Water Chemistry Control - BWR and One-Time Inspection Programs. During the audit and review, the project team noted that for ten AMR results lines that point to Table 3.1.1, Item 3.1.1-37, the applicant included a reference to Note E. The only components to which this NUREG-1801 line item applies are included in scope only under criterion 10 CFR 54.4(a)(2).

The project team reviewed the AMR results lines referenced to Note E and determined that the material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M25, "Reactor Water Cleanup System", the applicant proposed using the Water Chemistry Control - BWR and One-Time Inspection programs. The applicant stated in the LRA that Supplement 1 to GL 88-01 states that IGSCC inspection of RWCU piping outside of the containment isolation valves is recommended only until actions associated with GL 89-10 on motor operated valves are completed. Since PNPS has satisfactorily completed all actions requested in NRC GL 89-10, the Water Chemistry Control - BWR Program is used in lieu of the BWR Reactor Water Cleanup System Program to manage this potential aging effect. However, the GALL AMP also states that in addition to meeting this Supplement criterion, piping is made of material that is resistant to IGSCC. The project team asked the applicant to confirm the grade of stainless steel material used and justify that it is resistant to IGSCC.

In the response, the applicant stated that the original type 304 stainless steel piping and fittings between drywell penetration X-14 and the 6"x4" reducer downstream of MO-1201-5 were replaced with type 316L stainless steel. The project team reviewed the response and determined that type 316L is low-carbon grade (<.035% carbon) stainless steel that is resistant to IGSCC. Furthermore, Supplement 1 to GL 88-01 does indicate tha low grade carbon stainless steel, such as 304L, or 316L are resistant to IGSCC. On this basis, the project team found the applicant's use of Water Chemistry Control - BWR and One-time Inspection Programs for aging management of these RWCU components to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.3 Loss of material due to general, pitting and crevice corrosion

In the discussion section of Table 3.3.1, Item 3.3.1-40 of the PNPS LRA, the applicant stated that loss of material of steel tanks in diesel fuel oil system exposed to exposed to air-outdoor external environment is managed by the System Walkdown Program. During the audit and review, the project team noted that the AMR results line in Table 3.3.2-7, fuel oil system, that points to Table 3.1.1, Item 3.1.1-40, the applicant included a reference to Note E.

The project team reviewed the AMR results lines referenced to Note E and determined that the component type, material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M29, "Aboveground Steel Tanks Program," the applicant proposed using the System Walkdown Program. The project team reviewed the System Walkdown Program and determined that while this program may be an acceptable alternate for Aboveground Steel Tanks Program for inspection, however, Aboveground Steel Tanks Program has some preventive actions associated with it that are not addressed in the System Walkdown Program. Furthermore, the GALL AMP specifies wall thickness measurement of tank bottom if it is supported on earthen or concrete foundations.

The project team asked the applicant to clarify if the steel tanks are coated with protective paint or coating in accordance with industry practice, and whether sealant or caulking is applied at

the interface edge between the tank and the foundation as per the GALL AMP XI.M29. The project team asked the applicant to confirm how the tank is supported.

In its response, the applicant stated that no carbon steel tanks in the fuel oil system exposed to air-outdoor are included in the scope of license renewal. The LRA will be amended to remove the line item in Table 3.3.2-7 for carbon steel tanks exposed to air-outdoor. The discussion for line item 3.3.1-40 will be amended to state that the line item is not used.

In a letter dated July 19, 2006 **(MLxxxxxxxxx)**, the applicant stated that LRA Table 3.3.1, item 3.3.1-40 is revised to remove reference to the system walkdown program as follows:

> Not applicable. There are no steel tanks in the diesel fuel oil system exposed to air - outdoor (external).
>
> LRA Table 3.3.2-7 line item with component type of tank exposed to air – outdoor (ext) is removed.

On the basis that the carbon steel tank is not in scope of license renewal and the line item 3.3.1-40 is not used, the project team found the response to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.4 Loss of material due to general corrosion

In the discussion section of Table 3.3.1, Item 3.3.1-58 of the PNPS LRA, the applicant stated that loss of material of steel external surfaces exposed to air-indoor uncontrolled, air-outdoor, and condensation environments is managed by the System Walkdown Program. During the audit and review, the project team noted that the AMR results lines that point to Table 3.1.1, Item 3.1.1-58, the applicant has credited the Fire Protection program to manage loss of material for tank in Halon system. The applicant was asked to justify why the Fire Protection program was not identified in the discussion column of Table 3.3.1, item 3.3.1-58.

In a letter dated July 19, 2006 **(MLxxxxxxxxx)**, the applicant stated that LRA Table 3.3.1, item 3.3.1-58 discussion is revised to read as follows.

> The System Walkdown Program manages loss of material for external surfaces of steel components. For some fire protection system components, the Fire Protection Program will manage loss of material.
>
> In LRA Table 3.3.2-10 the note for the line item with component type of tank exposed to air – indoor (ext) is changed from "B" to "E".

On the basis that the applicant is revising the discussion for item 3.3.1-58 to include Fire Protection Program, the project team found the response acceptable. However, the applicant is crediting the Fire Protection Program as an alternate to the GALL AMP XI.M36, "External Surfaces Monitoring". The project team reviewed the Fire Protection program and determined that this program is an acceptable alternate to GALL AMP XI.M36 because it provides for

periodic inspection of Halon fire suppression system, which is similar to the visual inspection of external surfaces as recommended by the GALL AMP XI.M36.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.5 Increased hardness, shrinkage and loss of strength due to weathering

In the discussion section of Table 3.3.1, Item 3.3.1-61 of the PNPS LRA, the applicant stated that this line item was not used in the auxiliary systems tables. Fire barrier seals are evaluated as structural components in Section 3.5. Cracking and the change in material properties of elastomer seals are managed by the Fire Protection Program. In section 3.5, Table 3.5.2-6, Bulk Commodities, on pages 3.5-82, and 3.5-83, where line item 3.3.1-61 is referenced, PNPS credits the Fire Protection Program and the Structures Monitoring program. However, line item 3.3.1-61 does not credit structures monitoring program.

The project team asked the applicant to clarify if both programs are credited for managing aging effects for penetration seals as stated in Table 3.5.2-6.

In a letter dated July 19, 2006 **(MLxxxxxxxxx)**, the applicant revised LRA Table 3.5.2-6, pages 3.5-82 and 3.5-83 as follows:

Delete line items:
Penetration sealant (fire rated, flood, radiation) // EN, FB, FLB, PB, SNS // Elastomer // Protected from weather // Cracking Change in material properties // Fire protection/Structures Monitoring // III.A6-12 (TP-7) // 3.5.1-44 // C
Seismic joint filler // FB, SNS // Elastomer // Protected from weather // Cracking Change in material properties // Structures Monitoring, Fire Protection // VII.G-1 (A-19) // 3.3.1-61 // C

Add line items:
Penetration sealant (fire rated) // EN, FB, PB, SNS // Elastomer // Protected from weather // Cracking Change in material properties // Fire Protection // VII.G-1(A-19) // 3.3.1-61 // B

Penetration sealant (flood, radiation) // EN, FLB, PB, SNS // Elastomer // Protected from weather// Cracking Change in material properties // Structures Monitoring // III.A6-12 (TP-7) // 3.5.1-44 // C

Seismic isolation joint // FB, SNS // Elastomer // Protected from weather // Cracking Change in material properties // Fire protection // VII.G-1 (A-19) // 3.3.1-61 // D

Seismic isolation joint // SNS // Elastomer // Protected from weather // Cracking Change in material properties // Structures monitoring // III.A6-12 (TP-7) // 3.5.1-44 // C

On the basis that the applicant has clarified the use of Structures Monitoring Program and Fire Protection program and referenced different Table 1 line items, the project team found the response to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.6 Loss of material due to general, pitting and crevice corrosion

In the discussion section of Table 3.3.1, Item 3.3.1-64 of the PNPS LRA, the applicant stated that this line item was not used. Loss of material of steel components exposed to fuel oil was addressed by other items including line items 3.3.1-20 and 3.3.1-32. However, the intent of this line is to address the diesel driven fire pump, which is why the GALL report recommended the Fire Protection program. Neither line item 20 nor line item 32 credits the Fire Protection program, only Diesel Fuel monitoring program is credited. The project team asked the applicant to clarify if PNPS has a diesel driven fire pump, and if so, where in the IRA section 3.3 it is addressed and is the Fire protection program credited.

In its response, the applicant stated that PNPS has a diesel driven fire pump with components addressed in Table 3.3.2-7.The fuel oil supply to the diesel driven fire pump is included in Table 3.3.2-7. The line item of carbon steel piping with a fuel oil internal environment in Table 3.3.2-7 for the fuel supply line does not credit the Fire Protection Program. Although the programs credited in Table 3.3.2-7 for the fuel supply line provide an acceptable alternative approach to manage the effects of aging, in order to achieve consistency with NUREG-1801 the LRA will be revised to credit the Fire Protection Program. LRA Table 3.3.2-7 will be revised to add an additional line item to credit the Fire Protection Program to manage the fuel supply line in addition to the Diesel Fuel Monitoring Program. This will also require a change to line item 3.3.1-64 since the new line item will specify 3.3.1-64 as the Table 1 item.

In a letter dated July 19, 2006 **(MLxxxxxxxxx)**, the applicant revised Table 3.3.2-7 to add a line item crediting the fire protection program as follows.

Piping // Pressure boundary // Carbon steel // Fuel oil (int) // Loss of material // Fire Protection and Diesel Fuel Monitoring// VII.G-21 (A-28) // 3.3.1-64 // B

LRA Table 3.3.1, Item 3.3.1-64 discussion is revised as follows.

Consistent with NUREG-1801. The Fire Protection Program and Diesel Fuel Monitoring Program manage loss of material for internal surfaces of steel piping (fire pump diesel fuel supply line) components exposed to fuel oil.

On the basis that the applicant credits the Fire Protection Program to manage aging effects of the fire pump diesel fuel supply line, the project team found the applicant response to be acceptable.
On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.7 Loss of material due to general, pitting, crevice, and (for drip pans and drain lines) microbiologically influenced corrosion

In the discussion section of Table 3.3.1, Item 3.3.1-72 of the PNPS LRA, the applicant stated that loss of material of steel component internal surfaces exposed to exposed to condensation environment is managed by the System Walkdown Program. During the audit and review, the project team noted that the AMR results line in Table 3.3.2-3, RBCCW system, that points to Table 3.1.1, Item 3.1.1-72, the applicant included a reference to Note E. The only components to which this NUREG-1801 line item applies is heat exchanger housing.

The project team reviewed the AMR results lines referenced to Note E and determined that the component type, material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," the applicant proposed using the System Walkdown Program. The applicant stated that the System Walkdown Program manages loss of material for external carbon steel components by visual inspection of external surfaces. For systems where internal carbon steel surfaces are exposed to the same environment as external surfaces, external surfaces condition will be representative of internal surfaces. Thus, loss of material on internal carbon steel surfaces is also managed by the System Walkdown Program.

The project team asked the applicant to clarify how PNPS concluded that the internal surface of the heat exchanger is the same as the external surface in the RBCCW system.

In its response, the applicant stated that the internal components of the heat exchanger housing have the potential for being exposed to a combination of low temperature closed cooling water and high dewpoint indoor drywell air which could result (though not expected) in condensation on the cooling coil that would be collected in the bottom of the housing. Condensation was also identified on the un-insulated external surfaces of the heat exchanger housing due to the potential of the housing surface temperature downstream of the cooling coil being less than or equal to the dew point of the surrounding air in the drywell. These environments were conservatively identified even though the expected environment would be indoor air with no condensation since the cooling water temperature is normally maintained at ~ 80°F . System Walkdown was credited because the expected environment for both the internal and external surfaces would be the same in either case.

On the basis that the internal environment is the same as external environment, and since the System Walkdown Program is consistent with GALL AMP XI.M36, External Surfaces Monitoring, which states that the program may also be credited with managing loss of material from internal surfaces, for situations in which material and environmental conditions are the same for internal and external surfaces such that external surface condition is representative of internal surface condition, the project team found the applicant's use of System walkdown Program for aging management of this heat exchanger housing to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.8 Loss of material due to general and pitting corrosion; and loss of material due to general, pitting and crevice corrosion

In the discussion section of Table 3.3.1, Items 3.3.1-53 and 3.3.1-54 of the PNPS LRA, the applicant stated that loss of material of steel and stainless component internal surfaces exposed to exposed to condensation environment in instrument air system is managed by the Instrument Air Quality and One-Time Inspection Programs. During the audit and review, the project team noted that the AMR results line in Table 3.3.2-8, instrument air system, that points to Table 3.1.1, Items 3.1.1-53 and 3.3.1-54, the applicant included a reference to Note E.

The project team reviewed the AMR results lines referenced to Note E and determined that the component type, material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M24, "Compressed Air Monitoring", the applicant proposed using the Instrument Air Quality and One-Time Inspection Programs. The GALL AMP XI.M24 recommends periodic monitoring of air quality for presence of contaminants and visual inspection. The project team reviewed the Instrument Air Quality Program, which is a plant specific program and determined that the applicant performs periodic sampling at various locations in the system. Furthermore, the applicant has proposed a one-time inspection at susceptible locations to confirm that aging degradation is not occurring. On this basis, the project team found the applicant's use of Instrument Air Quality and One-Time Inspection Programs to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.9 Loss of material due to general, pitting and crevice corrosion

In the discussion section of Table 3.3.1, Item 3.3.1-59 of the PNPS LRA, the applicant stated that loss of material of steel heat exchanger tubes external surfaces exposed to air-indoor uncontrolled environment in security diesel system is managed by the Periodic Surveillance and Preventive Maintenance (PSPM) Program. During the audit and review, the project team noted that the AMR results line in Table 3.3.2-6, security diesel system, that points to Table 3.1.1, Item 3.1.1-59, the applicant included a reference to Note E.

The project team reviewed the AMR results lines referenced to Note E and determined that the component type, material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M36, "External Surface Monitoring", the applicant proposed using the PSPM Program. The GALL AMP recommends periodic visual inspections of external surfaces during system walkdowns for evidence of material loss. Since the surface of heat exchanger tubes are not easily accessible during system walkdowns , the applicant is crediting the PSPM Program, which uses visual or other NDE techniques to inspect a representative sample of security diesel oil cooler, aftercooler, and radiator tubes to manage loss of material. On the basis that periodic visual inspections are performed, the project team found the applicant's use of PSPM Program to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.10 Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling

In the discussion section of Table 3.3.1, Item 3.3.1-68 of the PNPS LRA, the applicant stated that loss of material of steel piping, piping components, and piping elements exposed to raw water environment is managed by the Periodic Surveillance and Preventive Maintenance (PSPM) Program. During the audit and review, the project team noted that the AMR results line that points to Table 3.1.1, Item 3.1.1-68, the applicant included a reference to Note E.

The project team reviewed the AMR results lines referenced to Note E and determined that the component type, material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M27, "Fire Water System", the applicant has proposed the PSPM Program. The GALL Report line item referenced is in the fire protection water system and therefore the GALL Report recommends AMP XI.M27. At PNPS, the fire protection water system does not use raw water, but instead uses treated water. The AMR results lines that point to table 3.1.1., item 3.3.1-68 are listed only in those systems that are in scope for criterion 10 CFR 54.4(a)(2) and are not in the fire protection water system. The PSPM Program uses visual or other NDE techniques to inspect a representative sample of nonsafety-related components affecting safety related systems, which include the AMR results lines that point to item 3.3.1-68. On the basis that periodic visual inspections are performed, the project team found the applicant's use of PSPM Program to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.11 Hardening and loss of strength due to elastomer degradation; loss of material due to erosion

In the discussion section of Table 3.3.1, Item 3.3.1-75 of the PNPS LRA, the applicant stated that degradation of elastomer components exposed to raw or untreated water environment is managed by the Periodic Surveillance and Preventive Maintenance (PSPM) Program. During the audit and review, the project team noted that the AMR results line that points to Table 3.1.1, Item 3.1.1-75, the applicant included a reference to Note E.

The project team reviewed the AMR results lines referenced to Note E and determined that the component type, material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M20, "Open-Cycle Cooling water System", the applicant has proposed the PSPM Program. The GALL Report line item referenced is in the open-cycle cooling water system and therefore the GALL Report recommends AMP XI.M20. However, the AMR results lines that point to table 3.1.1., item 3.3.1-75 are listed only in radwaste system that is in scope for criterion 10 CFR 54.4(a)(2) and are not in the open-cycle cooling water system. The PSPM Program visually inspects and manually flexes a representative sample of the flex/expansion joints in the radwaste system to manage cracking and change in material properties. On the basis that periodic visual inspections and manual flexing are performed, the project team found the applicant's use of PSPM Program to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.12 Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, fouling, and lining/coating degradation

In the discussion section of Table 3.3.1, Item 3.3.1-76 of the PNPS LRA, the applicant stated that loss of material of steel components exposed to raw water environment in the screen wash system is managed by the Periodic Surveillance and Preventive Maintenance (PSPM) Program. During the audit and review, the project team noted that the AMR results line that points to Table 3.1.1, Item 3.1.1-76, the applicant included a reference to Note E.

The project team reviewed the AMR results lines referenced to Note E and determined that the component type, material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M20, "Open-Cycle Cooling water System", the applicant has proposed the PSPM Program. The GALL Report line item referenced is in the open-cycle cooling water system and therefore the GALL Report recommends AMP XI.M20. However, the AMR results lines that point to table 3.1.1., item 3.3.1-76 are listed only in screen wash system that is in scope for criterion 10 CFR 54.4(a)(2) and are not in the open-cycle cooling water system. The PSPM Program uses visual or other NDE techniques to inspect a representative sample of nonsafety-related components affecting safety related systems, which include the AMR results lines that point to item 3.3.1-76. On the basis that periodic visual inspections are performed, the project team found the applicant's use of PSPM Program to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.13 Loss of material due to pitting and crevice corrosion

In the discussion section of Table 3.3.1, Item 3.3.1-78 of the PNPS LRA, the applicant stated that loss of material of nickel alloy components exposed to raw water environment in the screen wash system is managed by the Periodic Surveillance and Preventive Maintenance (PSPM) Program. During the audit and review, the project team noted that the AMR results line that points to Table 3.1.1, Item 3.1.1-78, the applicant included a reference to Note E.

The project team reviewed the AMR results lines referenced to Note E and determined that the component type, material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M20, "Open-Cycle Cooling water System", the applicant has proposed the PSPM Program. The GALL Report line item referenced is in the open-cycle cooling water system and therefore the GALL Report recommends AMP XI.M20. However, the AMR results lines that point to table 3.1.1., item 3.3.1-78 are listed only in screen wash system that is in scope for criterion 10 CFR 54.4(a)(2) and are not in the open-cycle cooling water system. The PSPM Program uses visual or other NDE techniques to inspect a representative sample of nonsafety-related components

affecting safety related systems, which include the AMR results lines that point to item 3.3.1-78. On the basis that periodic visual inspections are performed, the project team found the applicant's use of PSPM Program to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.14 Loss of material due to pitting and crevice corrosion and fouling

In the discussion section of Table 3.3.1, Item 3.3.1-79 of the PNPS LRA, the applicant stated that loss of material of stainless steel components exposed to raw or untreated water environment in the screen wash, sanitary soiled waste and vent; plumbing and drains, and radwaste systems is managed by the Periodic Surveillance and Preventive Maintenance (PSPM) and One-Time Inspection Programs. During the audit and review, the project team noted that the AMR results line that points to Table 3.1.1, Item 3.1.1-79, the applicant included a reference to Note E.

The project team reviewed the AMR results lines referenced to Note E and determined that the component type, material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M20, "Open-Cycle Cooling water System", the applicant has proposed the PSPM Program for the screen wash system and the One-Time Inspection Program for the other systems. The GALL Report line item referenced is in the open-cycle cooling water system and therefore the GALL Report recommends AMP XI.M20. However, the AMR results lines that point to table 3.1.1., item 3.3.1-79 are listed only in systems that are in scope for criterion 10 CFR 54.4(a)(2) and are not in the open-cycle cooling water system. The PSPM Program uses visual or other NDE techniques to inspect a representative sample of nonsafety-related components affecting safety related systems, which include the AMR results lines that point to item 3.3.1-79. The One-Time Inspection Program includes a one-time inspection activity that will confirm that loss of material is not occurring or is so insignificant that an aging management program is not warranted. On the basis that periodic or one-time visual inspections are performed, the project team found the applicant's use of PSPM Program and One-Time Inspection program to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.15 Loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling

In the discussion section of Table 3.3.1, Item 3.3.1-81 of the PNPS LRA, the applicant stated that loss of material of copper alloy components exposed to raw or untreated water environment in the nonsafety-related systems is managed by the Periodic Surveillance and Preventive Maintenance (PSPM) Program. During the audit and review, the project team noted that the AMR results line that points to Table 3.1.1, Item 3.1.1-81, the applicant included a reference to Note E.

The project team reviewed the AMR results lines referenced to Note E and determined that the component type, material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M20, "Open-Cycle Cooling water System", the applicant has proposed the PSPM Program. The GALL Report line item referenced is in the open-cycle cooling water system and therefore the GALL Report recommends AMP XI.M20. However, the AMR results lines that point to table 3.1.1., item 3.3.1-81 are listed only in nonsafety-related systems that are in scope for criterion 10 CFR 54.4(a)(2) and are not in the open-cycle cooling water system. The PSPM Program uses visual or other NDE techniques to inspect a representative sample of nonsafety-related components affecting safety related systems, which include the AMR results lines that point to item 3.3.1-81. On the basis that periodic visual inspections are performed, the project team found the applicant's use of PSPM Program to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.16 Cracking due to stress corrosion cracking

In the discussion section of Table 3.3.1, Item 3.3.1-38 of the PNPS LRA, the applicant stated that cracking of stainless steel components of the reactor water cleanup system exposed to treated water >60°C (140°F) is managed by the Water Chemistry Control - BWR and One-Time Inspection Programs. During the audit and review, the project team noted that for the AMR results lines that point to Table 3.1.1, Item 3.1.1-38, the applicant included a reference to Note E. The only components to which this NUREG-1801 line item applies are included in scope only under criterion 10 CFR 54.4(a)(2).

The project team reviewed the AMR results lines referenced to Note E and determined that the material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M7, "BWR Stress Corrosion Cracking" and AMP M2, "Water Chemistry", the applicant proposed using the Water Chemistry Control - BWR and One-Time Inspection programs. In the discussion column the applicant stated that none of these components are within the scope of the BWR Stress Corrosion Cracking program. The Water Chemistry Control - BWR Program provides for periodic sampling to mainatin contaminants within prescribed levels and the One-Time Inspection program verifies the effectiveness of the water chemistry program. On this basis, the project team found the applicant's use of Water Chemistry Control - BWR and One-time Inspection Programs for aging management of these nonsafety-related components to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.17 Loss of material due to general corrosion

During the audit and review, the project team noted that some AMR results lines pointed to section 3.2, ESF systems, Table 3.2.1, Item 3.2.1-32. For these line items, the applicant

included a reference to Note E. This line item applies to steel piping and ducting components and internal surfaces exposed to air-indoor uncontrolled environment. This line item was referenced on 26 component types.

The project team reviewed the AMR results lines referenced to Note E and determined that the component type, material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," the applicant has proposed System Walkdown Program for 15 component types, Fire Protection Program for 3 component types and Periodic Surveillance and Preventive Maintenance (PSPM) Program for 8 component types.

The GALL AMP XI.M38 states that this program consists of inspections of the internal surfaces of steel components that are not covered by other aging management programs and consists of periodic visual inspections. The applicant stated that the System Walkdown Program manages loss of material for external carbon steel components by visual inspection of external surfaces. For systems where internal carbon steel surfaces are exposed to the same environment as external surfaces, external surfaces condition will be representative of internal surfaces. Thus, loss of material on internal carbon steel surfaces is also managed by the System Walkdown Program. Since the applicant is using an existing aging management program that performs periodic visual inspections, the project team found the System Walkdown Program acceptable.

For the three component types where the applicant credited the Fire Protection Program, the project team found that this program was not credited in Table 3.2.1, line item 3.2.1-32 discussion column. The project team asked the applicant to clarify the discrepancy between the AMR results line items in Table 3.3.2-x and Table 3.2.1, item 3.2.1-32 where the Fire Protection Program is credited in one table, but not in the other table.

In its response, the applicant stated that the System Walkdown Program is the more appropriate program for two of these component types which are in the fire protection - water systems, and the LRA will be supplemented to revise the Table 3.3.2-x items. However, one component type is in fire protection - Halon system and the Fire Protection Program will be used to inspect piping internal surfaces. The LRA will be supplemented to add Fire Protection program to the discussion column of Table 3.2.1, item 3.2.1-32.

In a letter dated July 19, 2006 (MLxxxxxxxxx0, the applicant stated that LRA Table 3.2.1, item 3.2.1-32 is revised to add the Fire Protection Program to the list of programs managing internal surfaces of steel components exposed to air-indoor. **However, the LRA supplement does not address the change from Fire Protection program to System Walkdown program for two components in Table 3.3.2-x. {Open Item}**

The project team reviewed the Fire Protection program, which includes periodic inspection and testing of the Halon fire protection system. Since the applicant is using an existing aging management program that performs visual inspection of internal surfaces, the project team found the applicant's use of Fire Protection Program to be acceptable.

For the eight component types in the emergency diesel, station blackout diesel, and security diesel systems, the applicant credited PSPM Program. The PSPM Program uses visual or other NDE techniques to inspect a representative sample of the identified system components.

Since the applicant is using an existing aging management program that performs visual inspection of internal surfaces, the project team found the applicant's use of PSPM Program to be acceptable.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.18 Reduction of heat transfer due to fouling

During the audit and review, the project team noted that some AMR results lines pointed to section 3.2, ESF systems, Table 3.2.1, Item 3.2.1-9. For these line items, the applicant included a reference to Note E. This line item applies to copper alloy heat exchanger tubes exposed to lubricating oil environment. This line item was referenced on 2 component types.

During the audit and review, the project team noted that some AMR results lines pointed to section 3.4, Steam and Power Conversion systems, Table 3.4.1, Item 3.4.1-10. For these line items, the applicant included a reference to Note E. This line item applies to steel heat exchanger tubes exposed to lubricating oil environment. This line item was referenced on 1 component type.

The project team reviewed the AMR results lines referenced to Note E and determined that the material, environment, and aging effect are consistent with the corresponding line of the GALL Report; however, where the GALL Report recommends the AMP XI.M39, "Lubricating Oil Analysis" and XI.M32, "One-Time Inspection" to verify effectiveness of the lubricating oil analysis program. However, the applicant has only credited the Oil Analysis program. The project team reviewed the Oil Analysis Program. The applicant depends on operating experience at PNPS to verify the effectiveness of the Oil Analysis Program. The project team asked the applicant how it can make this statement if inspection has not been performed. In its response, the applicant stated that during the performance of routine maintenance on components that contain lubricating oil, visual inspections of these components would identify degraded conditions that could be attributed to an ineffective Oil Analysis Program. The corrective action program at PNPS has a low threshold for the identification of degraded condition such that corrosion or cracking of components would be identified as part of this program. The review of operating experience at PNPS for the last five years did not identify any condition reports that indicated an ineffective Oil Analysis Program or that identified degraded component conditions such as corrosion or cracking in a lubricating oil environment.

During the past five years, many visual inspections of components containing lubricating oil have been performed during corrective and preventive maintenance activities. The visual inspection of these components would identify degraded conditions such as corrosion or cracking that could be attributed to an ineffective Oil Analysis Program. No condition reports that identified degraded component conditions, such as corrosion and cracking in a lubricating oil environment, were initiated as a result of these inspections. These past inspections at PNPS serve in lieu of a one-time inspection to provide confirmation of the effectiveness of the Oil Analysis Program.

The project team reviewed Operating Experience Review Report, LRPD-05, Revision 0, and confirmed that there were no condition reports generated for degraded conditions of

components in a lubricating oil environment. On the basis that periodic inspections of components in a lubricating environment are performed during maintenance activities, and that operating experience has shown no degraded conditions, the project team determined that the Oil Analysis Program is appropriate for the aging effects/mechanisms identified and provide assurance that the aging effects/mechanisms are effectively managed through the period of extended operation. The Oil Analysis Program was evaluated by the project team and found acceptable for managing aging degradation.

On the basis of its review of AMR results lines as described in the preceding paragraphs and its comparison of the applicant's results with corresponding recommendations in the GALL Report, the project team found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3.2.1.19 Loss of material due to general pitting and crevice corrosion

In Table 3.3.2-14-27, RWCU system, page 3.3-234 of the LRA, for steel heat exchanger shell in treated water internal environment, the applicant has credited Water Chemistry Control - Closed Cooling Water Program and references Table 3.3.1, line item 3.3.1-17. However, item 3.3.1-17 addresses Water Chemistry Control - BWR Program. The project team asked the applicant to clarify this discrepancy.

In a letter dated July 19, 2006 **(MLxxxxxxxxx)**, the applicant stated that the LRA Table 3.3.2-14-27, last three columns for the carbon steel component type heat exchanger shell, in treated water environment with an aging effect of loss of material, are revised to VII.C2-14 (A-25), 3.3.1-47, and D.

The project team reviewed Table 3.3.1, item 3.3.1-47 and found the applicant response to be acceptable.

In Table 3.3.2-14-27, RWCU system, page 3.3-235 of the LRA, for stainless steel orifice in treated water internal environment, the applicant has credited Water Chemistry Control - Closed Cooling Water Program and references Table 3.3.1, line item 3.3.1-17. However, item 3.3.1-17 addresses steel components, not stainless steel. The project team asked the applicant to clarify this discrepancy.

In a letter dated July 19, 2006 **(MLxxxxxxxxx)**, the applicant stated that LRA Table 3.3.2-14-27, stainless steel component type orifice, in treated water environment with an aging effect of loss of material is revised to list Table 1 item number 3.3.1-24.

The project team reviewed line 3.3.1-24 and confirmed that it does address stainless steel components and found the applicant response to be acceptable.

Conclusion

The project team has evaluated the applicant's claim of consistency with the GALL Report. The project team also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the project team found that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the project team found that the applicant has demonstrated that the effects of aging for these

components will be adequately managed so that their intended function(s) will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2 AMR Results For Which Further Evaluation Is Recommended By The GALL Report

Summary of Information in the Application

In PNPS LRA Section 3.3.2.2, the applicant provides further evaluation of aging management as recommended by the GALL Report for the auxiliary systems subject to an aging management review. The applicant also provides information concerning how it will manage the related aging effects.

Project Team Evaluation

For some AMR line-items assigned to the project team in the PNPS LRA Tables 3.3.1, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in PNPS LRA Section 3.3.2.2 against the criteria provided in the SRP-LR Section 3.3.2.2. The project team's assessments of these evaluations is documented in this section. These assessments are applicable to each Table 2 AMR line-item in Section 3.3 citing the item in Table 1.

3.3.2.2.1 Cumulative Fatigue Damage

In the PNPS LRA Section 3.3.2.2.1, the applicant stated that fatigue is a TLAA, as defined in 10 CFR 54.3 and TLAAs are evaluated in accordance with 10 CFR 54.21(c). The project team's evaluation of this TLAA is addressed separately in Section 4.3 of the SER related to the PNPS LRA.

3.3.2.2.2 Reduction of Heat Transfer Due to Fouling

The project team reviewed PNPS LRA Section 3.3.2.2.2 against the criteria in SRP-LR Section 3.3.2.2.2.

SRP-LR Section 3.3.2.2.2 states that the reduction of heat transfer due to fouling could occur for stainless steel heat exchanger tubes exposed to treated water. The existing program relies on control of water chemistry to manage reduction of heat transfer due to fouling. However, control of water chemistry may have been inadequate. Therefore, the GALL Report recommends that the effectiveness of the water chemistry control program should be verified to ensure that reduction of heat transfer due to fouling is not occurring. A one-time inspection is an acceptable method to ensure that reduction of heat transfer is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the PNPS LRA Section 3.3.2.2.2, the applicant states that reduction of heat transfer due to fouling could occur for stainless steel heat exchanger tubes exposed to treated water. However, heat transfer is not a license renewal intended function for any of the auxiliary system heat exchangers with stainless steel tubes exposed to treated water. Therefore, this item is not applicable to PNPS.

On the basis that there are no stainless steel heat exchangers in the auxiliary systems with

intended functions of heat transfer, the project team found that, for this component type, this aging effect is not applicable to PNPS.

3.3.2.2.3 Cracking Due to Stress Corrosion Cracking (SCC)

3.3.2.2.3.1 Cracking Due to Stress Corrosion Cracking (SCC) [Item 1]

The project team reviewed PNPS LRA Section 3.3.2.2.3.1 against the criteria in SRP-LR Section 3.3.2.2.3.1.

SRP-LR Section 3.3.2.2.3.1 states that cracking due to SCC could occur in the stainless steel piping, piping components, and piping elements of the BWR Standby Liquid Control system that are exposed to sodium pentaborate solution greater than 60°C (>140°F). The existing aging management program relies on monitoring and control of water chemistry to manage the aging effects of cracking due to SCC. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause SCC. Therefore, the GALL Report recommends that the effectiveness of the water chemistry control program should be verified to ensure that SCC is not occurring. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that SCC is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the PNPS LRA Section 3.3.2.2.3.1, the applicant states that cracking due to SCC can occur in the stainless steel piping, piping components, and piping elements of the BWR standby liquid control (SLC) system that are exposed to sodium pentaborate solution greater than 140°F. At PNPS the sodium pentaborate solution in the SLC system does not exceed 140°F. Therefore cracking due to SCC is not an aging effect requiring management for the SLC system. This item is not applicable to PNPS.

On the basis that there are no stainless steel standby liquid control system components with intended functions exposed to treated water >140°F, the project team found that, for this component type, this aging effect is not applicable to PNPS.

3.3.2.2.3.2 Cracking Due to Stress Corrosion Cracking (SCC) [Item 2]

The project team reviewed PNPS LRA Section 3.3.2.2.3.2 against the criteria in SRP-LR Section 3.3.2.2.3.2.

SRP-LR Section 3.3.2.2.3.2 states that cracking due to SCC could occur in stainless steel and stainless clad steel heat exchanger components exposed to treated water greater than 60°C (>140°F). The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1

In the PNPS LRA Section 3.3.2.2.3.2, the applicant states that cracking due to SCC in stainless steel heat exchanger components exposed to treated water greater than 140°F is an aging effect requiring management at PNPS. There are no auxiliary system components at PNPS with stainless steel cladding. For PNPS auxiliary systems these stainless steel heat exchanger components are managed by the Water Chemistry Control – BWR Program. This program monitors parameters and contaminants to ensure they remain within the limits specified by the EPRI guidelines. The effectiveness of the Water Chemistry Control - BWR Program will be

confirmed by the One-Time Inspection Program through an inspection of a representative sample of components crediting this program for managing cracking using visual and ultrasonic inspection techniques.

The project team reviewed and determined that the applicant's Plant Chemistry program exceptions were non-technical, the program is based on a more recent EPRI document for BWR water chemistry, versus the GALL Report recommended EPRI document BWRVIP-29 (TR-103515). The project team determined that the use of a more recent issue of the BWRVIP chemistry program document was acceptable. In the discussion column of Table 3.3.1, item 5, the applicant stated that the One-Time Inspection (OTI) Program will be used to verify the effectiveness of the water chemistry program. However, for those line items in Table 3.3.2-X, where this Table 3.3.1 line item is referenced, only the Water Chemistry Control - BWR Program is credited. The project team asked the applicant a generic question to resolve the discrepancy why the OTI Program was not credited in the Table 2 line items that references this Table 1 line item.

In its response, the applicant stated that since the OTI Program is applicable to each water chemistry control program, it is also applicable to each line item in Table 2 that credits a water chemistry control program. LRA Table 3.3.1 indicates that the OTI Program is credited along with the water chemistry control programs for line items where GALL recommends a one-time inspection to confirm water chemistry control. Table 2 credits the OTI Program through reference to the associated Table 1 line item. The applicant further stated that the water chemistry control programs in LRA Appendices A and B will be revised to clearly indicate that the OTI Program will verify the effectiveness of the Water Chemistry Control - BWR Program.

In a letter dated July 19, 2006 **(MLxxxxxxxxx)**, the applicant stated that the effectiveness of the Water Chemistry Control – Auxiliary Systems, BWR, and Closed Cooling Water programs is confirmed by the One-Time Inspection program. For further clarification, LRA Appendix A is revised for these three water chemistry control programs to include the sentence "The One-Time Inspection Program will confirm the effectiveness of the program". **However, the LRA supplement has not added this sentence to Appendix B, Water Chemistry programs. {Open Item}**

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.3.2 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.3.3 Cracking Due to Stress Corrosion Cracking (SCC) [Item 3]

The project team reviewed PNPS LRA Section 3.3.2.2.3.3 against the criteria in SRP-LR Section 3.3.2.2.3.3.

SRP-LR Section 3.3.2.2.3.3 states that cracking due to SCC could occur in stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust. The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1

In the PNPS LRA Section 3.3.2.2.3.3, the applicant states that cracking due to SCC in stainless steel diesel engine exhaust piping exposed to diesel exhaust is an aging effect requiring management at PNPS. At PNPS cracking of stainless steel exhaust piping in the station blackout diesel generator system is managed by the Periodic Surveillance and Preventive Maintenance (PSPM) Program. This program uses visual and other NDE techniques to manage cracking of the piping. These inspections will manage the aging effect of cracking such that the intended function of the component will not be affected.

The project team reviewed the PSPM Program and determined that since visual or other NDE techniques are used to inspect a representative sample of station blackout diesel exhaust components, the aging effect of cracking will be effectively managed.

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.3.3 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.4 Cracking Due to Stress Corrosion Cracking and Cyclic Loading

3.3.2.2.4.1 Cracking Due to Stress Corrosion Cracking and Cyclic Loading [Item 1]

The project team reviewed PNPS LRA Section 3.3.2.2.4.1 against the criteria in SRP-LR Section 3.3.2.2.4.1.

SRP-LR Section 3.3.2.2.4.1 states that cracking due to SCC and cyclic loading could occur in stainless steel PWR nonregenerative heat exchanger components exposed to treated borated water greater than 60°C (>140°F) in the chemical and volume control system. The existing aging management program on monitoring and control of primary water chemistry in PWRs to manage the aging effects of cracking due to SCC. However, control of water chemistry does not preclude cracking due to SCC and cyclic loading. Therefore, the effectiveness of the water chemistry control program should be verified to ensure that cracking is not occurring. The GALL Report recommends that a plant-specific aging management program be evaluated to verify the absence of cracking due to SCC and cyclic loading to ensure that these aging effects are managed adequately. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.

PNPS is a BWR and does not have a stainless steel nonregenerative heat exchanger exposed to treated borated water. This item is not applicable to PNPS.

3.3.2.2.4.2 Cracking Due to Stress Corrosion Cracking and Cyclic Loading [Item 2]

The project team reviewed PNPS LRA Section 3.3.2.2.4.2 against the criteria in SRP-LR Section 3.3.2.2.4.2.

SRP-LR Section 3.3.2.2.4.2 states that cracking due to SCC and cyclic loading could occur in stainless steel PWR regenerative heat exchanger components exposed to treated borated water greater than 60°C (>140°F). The existing aging management program relies on monitoring and control of primary water chemistry in PWRs to manage the aging effects of cracking due to SCC. However, control of water chemistry does not preclude cracking due to

SCC and cyclic loading. Therefore, the effectiveness of the water chemistry control program should be verified to ensure that cracking is not occurring. The GALL Report recommends that a plant-specific aging management program be evaluated to verify the absence of cracking due to SCC and cyclic loading to ensure that these aging effects are managed adequately. Acceptance criteria are described in Branch Technical Position RLSB-1

PNPS is a BWR and does not have a stainless steel nonregenerative heat exchanger exposed to treated borated water. This item is not applicable to PNPS.

3.3.2.2.4.3 Cracking Due to Stress Corrosion Cracking and Cyclic Loading [Item 3]

The project team reviewed PNPS LRA Section 3.3.2.2.4.3 against the criteria in SRP-LR Section 3.3.2.2.4.3.

SRP-LR Section 3.3.2.2.4.3 states that cracking due to SCC and cyclic loading could occur for the stainless steel pump casing for the PWR high-pressure pumps in the chemical and volume control system. The existing aging management program relies on monitoring and control of primary water chemistry in PWRs to manage the aging effects of cracking due to SCC. However, control of water chemistry does not preclude cracking due to SCC and cyclic loading. Therefore, the effectiveness of the water chemistry control program should be verified to ensure that cracking is not occurring. The GALL Report recommends that a plant-specific aging management program be evaluated to verify the absence of cracking due to SCC and cyclic loading to ensure that these aging effects are managed adequately. Acceptance criteria are described in Branch Technical Position RLSB-1

PNPS is a BWR and does not have a chemical volume control system. This item is not applicable to PNPS.

3.3.2.2.5 Hardening and Loss of Strength Due to Elastomer Degradation

3.3.2.2.5.1 Hardening and Loss of Strength Due to Elastomer Degradation [Item 1]

The project team reviewed PNPS LRA Section 3.3.2.2.5.1 against the criteria in SRP-LR Section 3.3.2.2.5.1.

SRP-LR Section 3.3.2.2.5.1 states that hardening and loss of strength due to elastomer degradation could occur in elastomer seals and components of heating and ventilation systems exposed to air – indoor uncontrolled (internal/external. The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1

In the PNPS LRA Section 3.3.2.2.5.1, the applicant states that cracking and change in material properties due to elastomer degradation in elastomer duct flexible connections of the heating, ventilation and air conditioning systems exposed to air-indoor are aging effects requiring management at PNPS. These aging effects are managed by the Periodic Surveillance and Preventive Maintenance (PSPM) Program. The PSPM Program includes visual inspections and physical manipulation of the flexible connections to confirm that the components are not experiencing any aging that would affect accomplishing their intended functions.

The project team reviewed the PSPM Program and determined that since visual inspections

and manipulation of the flexible connections are performed at periodic intervals, the aging effect of hardening and loss of strength of elastomer components will be effectively managed.

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.5.1 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.5.2 Hardening and Loss of Strength Due to Elastomer Degradation [Item 2]

The project team reviewed PNPS LRA Section 3.3.2.2.5.2 against the criteria in SRP-LR Section 3.3.2.2.5.2.

SRP-LR Section 3.3.2.2.5.2 states that hardening loss of strength due to elastomer degradation could occur in elastomer linings of the filters, valves, and ion exchangers in spent fuel pool cooling and cleanup systems (BWR and PWR) exposed to treated water or to treated borated water. The GALL Report recommends that a plant-specific aging management program be evaluated to determine and assesses the qualified life of the linings in the environment to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1

In the PNPS LRA Section 3.3.2.2.5.2, the applicant states that for the auxiliary systems at PNPS, no credit is taken for any elastomer linings to prevent loss of material from the underlying carbon steel material such that the material is identified as carbon steel for the aging management review. This item is not applicable to PNPS.

Since no credit is taken for elastomer linings to prevent loss of material from the underlying carbon steel material, the project team determined that this line item is not applicable to PNPS.

3.3.2.2.6 Reduction of Neutron-Absorbing Capacity and Loss of Material Due to General Corrosion

The project team reviewed PNPS LRA Section 3.3.2.2.6 against the criteria in SRP-LR Section 3.3.2.2.6.

SRP-LR Section 3.3.2.2.6 states that a reduction of neutron-absorbing capacity and loss of material due to general corrosion could occur in the neutron-absorbing sheets of BWR and PWR spent fuel storage racks exposed to treated water or to treated borated water. The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1

In the PNPS LRA Section 3.3.2.2.6, the applicant states that the loss of material and cracking are aging effects requiring management for Boral spent fuel storage racks exposed to a treated water environment. These aging effects are managed by the Water Chemistry Control – BWR Program.

Reduction of neutron-absorbing capacity is insignificant and requires no aging management. The potential for aging effects due to sustained irradiation of Boral was previously evaluated by

the staff (BNL-NUREG-25582, dated January 1979; NUREG-1787, VC Summer SER, paragraph 3.5.2.4.2, page 3-408) and determined to be insignificant. Plant operating experience with the Boral coupon inspected in 2000 is consistent with the staff's conclusion and an aging management program is not required.

The project team reviewed the Water Chemistry Control - BWR Program, which monitors chlorides, sulfates and dissolved oxygen to limit the contaminants. The project team reviewed and determined that loss of material due to general corrosion will be managed by the Plant Chemistry program. The applicant has stated that water chemistry control programs will be verified for effectiveness by the One-Time Inspection program. The One-Time Inspection of boral coupon test specimens is performed to confirm that no significant aging degradation will occur. The One-Time Inspection program has provisions to increase frequency of inspections based on the results of the first inspection.

These aging management programs are appropriate for the aging effects/mechanisms identified and provide assurance that the aging effects/mechanisms are effectively managed through the period of extended operation. The Plant Chemistry program and the One-Time Inspection program were evaluated by the project team and found acceptable for managing aging degradation.

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.6 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.7 Loss of Material Due to General, Pitting, and Crevice Corrosion

3.3.2.2.7.1 Loss of Material Due to General, Pitting, and Crevice Corrosion [Item 1]

The project team reviewed PNPS LRA Section 3.3.2.2.7.1 against the criteria in SRP-LR Section 3.3.2.2.7.1.

SRP-LR Section 3.3.2.2.7.1 states that a loss of material due to general, pitting, and crevice corrosion could occur in steel piping, piping components, and piping elements, including the tubing, valves, and tanks in the reactor coolant pump oil collection system, exposed to lubricating oil (as part of the fire protection system). The existing aging management program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the lubricating oil program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In addition, corrosion may occur at locations in the reactor coolant pump oil collection tank where water from wash downs may accumulate. Therefore, the effectiveness of the program should be verified to ensure that corrosion is not occurring. The GALL Report recommends

further evaluation of programs to manage loss of material due to general, pitting, and crevice corrosion, to include determining the thickness of the lower portion of the tank. A one-time inspection is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the PNPS LRA Section 3.3.2.2.7.1, the applicant states that steel piping and components in auxiliary systems at PNPS that are exposed to lubricating oil are managed by the Oil Analysis Program, which includes periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. Operating experience at PNPS has confirmed the effectiveness of this program in maintaining contaminants within limits such that corrosion has not and will not affect the intended functions of these components. PNPS is a BWR with an inert containment atmosphere and as a result has no reactor coolant pump oil collection system.

The project team reviewed the Oil Analysis Program. The applicant depends on operating experience at PNPS to verify the effectiveness of the Oil Analysis Program. The project team asked the applicant how it can make this statement if inspection has not been performed. In its response, the applicant stated that during the performance of routine maintenance on components that contain lubricating oil, visual inspections of these components would identify degraded conditions that could be attributed to an ineffective Oil Analysis Program. The corrective action program at PNPS has a low threshold for the identification of degraded condition such that corrosion or cracking of components would be identified as part of this program. The review of operating experience at PNPS for the last five years did not identify any condition reports that indicated an ineffective Oil Analysis Program or that identified degraded component conditions such as corrosion or cracking in a lubricating oil environment.

During the past five years, many visual inspections of components containing lubricating oil have been performed during corrective and preventive maintenance activities. The visual inspection of these components would identify degraded conditions such as corrosion or cracking that could be attributed to an ineffective Oil Analysis Program. No condition reports that identified degraded component conditions, such as corrosion and cracking in a lubricating oil environment, were initiated as a result of these inspections. These past inspections at PNPS serve in lieu of a one-time inspection to provide confirmation of the effectiveness of the Oil Analysis Program.

The project team reviewed Operating Experience Review Report, LRPD-05, Revision 0, and confirmed that there were no condition reports generated for degraded conditions of components in a lubricating oil environment. On the basis that periodic inspections of components in a lubricating environment are performed during maintenance activities, and that operating experience has shown no degraded conditions, the project team determined that the Oil Analysis Program is appropriate for the aging effects/mechanisms identified and provide assurance that the aging effects/mechanisms are effectively managed through the period of extended operation. The Oil Analysis Program was evaluated by the project team and found acceptable for managing aging degradation.

The project team found that, based on the program identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.7.1 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.7.2 Loss of Material Due to General, Pitting, and Crevice Corrosion [Item 2]

The project team reviewed PNPS LRA Section 3.3.2.2.7.2 against the criteria in SRP-LR Section 3.3.2.2.7.2.

SRP-LR Section 3.3.2.2.7.2 states that the loss of material due to general, pitting, and crevice corrosion could occur in steel piping, piping components, and piping elements in the BWR reactor water cleanup and shutdown cooling systems exposed to treated water. The existing aging management program relies on monitoring and control of reactor water chemistry to manage the aging effects of loss of material from general, pitting and crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause general, pitting, or crevice corrosion. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from general, pitting, and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the PNPS LRA Section 3.3.2.2.7.2, the applicant states that PNPS does not have a separate shutdown cooling system. Loss of material due to general, pitting, and crevice corrosion in carbon steel piping and components in other auxiliary systems exposed to treated water are managed by the Water Chemistry Control – BWR Program. The effectiveness of the Water Chemistry Control - BWR Program will be confirmed by the One-Time Inspection Program through an inspection of a representative sample of components crediting this program including areas of stagnant flow.

The project team reviewed and determined that the applicant's Plant Chemistry program exceptions were non-technical, the program is based on a more recent EPRI document for BWR water chemistry, versus the GALL Report recommended EPRI document BWRVIP-29 (TR-103515). The project team determined that the use of a more recent issue of the BWRVIP chemistry program document was acceptable. In the discussion column of Table 3.3.1, item 17, the applicant stated that the One-Time Inspection (OTI) Program will be used to verify the effectiveness of the water chemistry program. However, for those line items in Table 3.3.2-X, where this Table 3.3.1 line item is referenced, only the Water Chemistry Control - BWR Program is credited. The project team asked the applicant a generic question to resolve the discrepancy why the OTI Program was not credited in the Table 2 line items that references this Table 1 line item.

In its response, the applicant stated that since the OTI Program is applicable to each water chemistry control program, it is also applicable to each line item in Table 2 that credits a water chemistry control program. LRA Table 3.3.1 indicates that the OTI Program is credited along with the water chemistry control programs for line items where GALL recommends a one-time inspection to confirm water chemistry control. Table 2 credits the OTI Program through reference to the associated Table 1 line item. The applicant further stated that the water chemistry control programs in LRA Appendices A and B will be revised to clearly indicate that the OTI Program will verify the effectiveness of the Water Chemistry Control - BWR Program.

In a letter dated July 19, 2006 **(MLxxxxxxxxx)**, the applicant stated that the effectiveness of the

Water Chemistry Control – Auxiliary Systems, BWR, and Closed Cooling Water programs is confirmed by the One-Time Inspection program. For further clarification, LRA Appendix A is revised for these three water chemistry control programs to include the sentence "The One-Time Inspection Program will confirm the effectiveness of the program". **However, the LRA supplement has not added this sentence to Appendix B, Water Chemistry programs. {Open Item}**

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.7.2 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.7.3 Loss of Material Due to General, Pitting, and Crevice Corrosion [Item 3]

The project team reviewed PNPS LRA Section 3.3.2.2.7.3 against the criteria in SRP-LR Section 3.3.2.2.7.3.

SRP-LR Section 3.3.2.2.7.3 states that a loss of material due to general (steel only) pitting and crevice corrosion could occur for steel and stainless steel diesel exhaust piping, piping components, and piping elements exposed to diesel exhaust. The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1

In the PNPS LRA Section 3.3.2.2.7.3, the applicant states that the loss of material due to general (steel only) pitting and crevice corrosion for carbon steel and stainless steel diesel exhaust piping and components exposed to diesel exhaust in the emergency diesel generator, station blackout diesel generator, and security diesel generator systems is managed by the Periodic Surveillance and Preventive Maintenance Program. This program uses visual and other NDE techniques to manage loss of material for these components. The carbon steel diesel exhaust piping and components in the fire protection system is managed by the Fire Protection Program. The Fire Protection Program uses visual inspections of diesel exhaust piping and components to manage loss of material. These inspections in the PSPM and fire protection programs will manage the aging effect of loss of material such that the intended function of the components will not be affected.

The project team reviewed the PSPM Program and determined that since visual or other NDE techniques are used to inspect a representative sample of emergency diesel generator, station blackout diesel generator and security diesel generator exhaust components, the aging effect of loss of material will be effectively managed.

The project team reviewed the Fire Protection Program and determined that the program description does not include these components nor has the program been enhanced to include these components. The project team asked the applicant to clarify how the Fire Protection Program will manage the aging effects for these components. In its response, the aplicant stated that per AMP B.1.13.1, procedures will be enhanced to verify that the diesel engine does not exhibit signs of degradation while running; such as exhaust gas leakage. Through monitoring and trending of performance data under the Fire Protection Program, loss of material for the fire pump diesel exhaust system components will be identified and corrected

through the corrective action program. As described in section B.1.13.1, observation of degraded performance produced corrective actions including engine replacement in 2002 prior to loss of intended function. Consequently, continued implementation of the Fire Protection Program provides reasonable assurance that aging effects will be managed for the diesel fire pump exhaust subsystem. In addition, PNPS performs fire pump inspection, testing and maintenance in accordance with NFPA 25 which would also detect the presence of aging effects in the exhaust system prior to loss of intended function.

The project team reviewed the response and found that the applicant was managing the aging effects by verifying that there is no leakage. The project team determined that verifying for leakage is not an adequate aging management program, since it implies a through wall leakage. The project team asked the applicant to justify how the aging is managed if it is a through wall leakage. In its response the applicant stated that enhancements will be made to the Fire Protection Program to credit existing or implement new preventive maintenance tasks for the fire pump diesel to ensure that all aging effects identified in Table 3.3.2-9 line items that apply to the fire pump diesel components are adequately managed and intended functions are maintained without crediting the detection of leakage as managing an aging effect.

In a letter dated July 19, 2006 (MLxxxxxxxxx), the applicant stated that this is license renewal commitment 7. LRA Section A.2.1.13 is revised to clarify inspection of the diesel-driven fire pump as follows.

The diesel-driven fire pump inspection requires that the pump be periodically tested and system components internally inspected to ensure that the fuel supply line and engine support systems can perform their intended function.

LRA Section B.1.13.1 is revised with the following enhancement.

Attributes Affected	Enhancements
3. Parameters Monitored/Inspected 6. Acceptance Criteria	Procedures will be enhanced to clarify that at least once every five years, the diesel driven fire pump engine is inspected for evidence of corrosion to manage loss of material in carbon steel and gray cast iron components including the intake air, exhaust, jacket water, and lube oil subsystems. The jacket water heat exchanger is inspected for evidence of fouling on the tubes. Also, the engine exhaust piping and silencer are inspected for evidence of cracking.

On the basis that the applicant is crediting periodic visual inspection to manage aging effects in lieu of monitoring for leakage, the project team found the enhancement to be acceptable.

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.7.3 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.8 Loss of Material Due to General, Pitting, Crevice, and Microbiologically-Influenced Corrosion (MIC)

The project team reviewed PNPS LRA Section 3.3.2.2.8 against the criteria in SRP-LR Section 3.3.2.2.8.

SRP-LR Section 3.3.2.2.8 states that a Loss of material due to general, pitting, crevice corrosion, and microbiologically-influenced corrosion (MIC) could occur for steel (with or without coating or wrapping) piping, piping components, and piping elements buried in soil. The buried piping and tanks inspection program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general, pitting, and crevice corrosion and MIC. The effectiveness of the buried piping and tanks inspection program should be verified to evaluate an applicant's inspection frequency and operating experience with buried components, ensuring that loss of material is not occurring.

In the PNPS LRA Section 3.3.2.2.8, the applicant states that the loss of material due to general, pitting, crevice, and MIC for carbon steel (with or without coating or wrapping) piping and components buried in soil in the salt service water, fuel oil, and fire protection-water systems at PNPS is managed by the Buried Piping and Tanks Inspection Program. This program will include (a) preventive measures to mitigate corrosion and (b) inspections to manage the effects of corrosion on the pressure-retaining capability of buried carbon steel components. Buried components will be inspected when excavated during maintenance. An inspection will be performed within 10 years of entering the period of extended operation, unless an opportunistic inspection occurred within this ten-year period. This program will manage the aging effect of loss of material such that the intended function of the components will not be affected.

The project team reviewed the Buried Piping and Tanks Inspection Program, which is consistent with the GALL AMP XI.M34. On the basis that periodic inspections, including opportunistic inspections will be performed on buried piping, the project team determined that the Buried Piping and Tanks inspection Program is appropriate for the aging effects/mechanisms identified and provide assurance that the aging effects/mechanisms are effectively managed through the period of extended operation.

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.8 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.9 Loss of Material Due to General, Pitting, Crevice, Microbiologically-Influenced Corrosion and Fouling

3.3.2.2.9.1 Loss of Material Due to General, Pitting, Crevice, Microbiologically-Influenced Corrosion and Fouling [Item1]

The project team reviewed PNPS LRA Section 3.3.2.2.9.1 against the criteria in SRP-LR Section 3.3.2.2.9.1.

SRP-LR Section 3.3.2.2.9.1 states that a loss of material due to general, pitting, crevice, MIC, and fouling could occur for steel piping, piping components, piping elements, and tanks

exposed to fuel oil. The existing aging management program relies on the fuel oil chemistry program for monitoring and control of fuel oil contamination to manage loss of material due to corrosion or fouling. Corrosion or fouling may occur at locations where contaminants accumulate. The effectiveness of the fuel oil chemistry control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material due to general, pitting, crevice, MIC, and fouling to verify the effectiveness of the fuel oil chemistry program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the PNPS LRA Section 3.3.2.2.9.1, the applicant states that fouling is not an aging effect requiring management for the fuel oil system at PNPS. Loss of material due to general, pitting, crevice, and MIC for carbon steel piping and components exposed to fuel oil is an aging effect requiring management at PNPS and these components are managed by the Diesel Fuel Monitoring Program. This program includes sampling and monitoring of fuel oil quality to ensure they remain within the limits specified by the ASTM standards. Maintaining parameters within limits ensures that significant loss of material will not occur. Ultrasonic inspections of storage tank bottoms where water and contaminants accumulate will be performed to confirm the effectiveness of the Diesel Fuel Monitoring Program. In addition, operating experience at PNPS has confirmed the effectiveness of this program in maintaining fuel oil quality within limits such that loss of material will not affect the intended functions of these components.

The project team reviewed the Diesel Fuel Monitoring Program, which includes sampling and monitoring of fuel oil quality. In lieu of using the One-Time Inspection Program to verify effectiveness, the applicant performs UT inspections of tank bottoms, which is where corrosion is likely to occur due to any water accumulation. Since the most susceptible location will be inspected for loss of material, the project team determined that the performance of UT inspection of bottom of storage tank is an acceptable method of verifying the effectiveness of the Diesel Fuel Monitoring Program.

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.9.1 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.9.2 Loss of Material Due to General, Pitting, Crevice, Microbiologically-Influenced Corrosion and Fouling [Item 2]

The project team reviewed PNPS LRA Section 3.3.2.2.9.2 against the criteria in SRP-LR Section 3.3.2.2.9.2.

SRP-LR Section 3.3.2.2.9.2 states that a loss of material due to general, pitting, crevice, MIC, and fouling could occur for steel heat exchanger components exposed to lubricating oil. The existing aging management program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil control should be verified to ensure that corrosion is not occurring. The GALL Report recommends

further evaluation of programs to manage corrosion to verify the effectiveness of the lube oil program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the PNPS LRA Section 3.3.2.2.9.2, the applicant states that the loss of material due to general, pitting, crevice, MIC and fouling for carbon steel heat exchanger components exposed to lubricating oil is an aging effect requiring management in the auxiliary systems at PNPS, and is managed by the Oil Analysis Program. This program includes periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion or fouling. Operating experience at PNPS has confirmed the effectiveness of this program in maintaining contaminants within limits such that corrosion and fouling has not and will not affect the intended functions of these components.

The applicant depends on operating experience at PNPS to verify the effectiveness of the Oil Analysis Program. The project team asked the applicant how it can make this statement if inspection has not been performed. In its response, the applicant stated that during the performance of routine maintenance on components that contain lubricating oil, visual inspections of these components would identify degraded conditions that could be attributed to an ineffective Oil Analysis Program. The corrective action program at PNPS has a low threshold for the identification of degraded condition such that corrosion or cracking of components would be identified as part of this program. The review of operating experience at PNPS for the last five years did not identify any condition reports that indicated an ineffective Oil Analysis Program or that identified degraded component conditions such as corrosion or cracking in a lubricating oil environment.

During the past five years, many visual inspections of components containing lubricating oil have been performed during corrective and preventive maintenance activities. The visual inspection of these components would identify degraded conditions such as corrosion or cracking that could be attributed to an ineffective Oil Analysis Program. No condition reports that identified degraded component conditions, such as corrosion and cracking in a lubricating oil environment, were initiated as a result of these inspections. These past inspections at PNPS serve in lieu of a one-time inspection to provide confirmation of the effectiveness of the Oil Analysis Program.

The project team reviewed Operating Experience Review Report, LRPD-05, Revision 0, and confirmed that there were no condition reports generated for degraded conditions of components in a lubricating oil environment. On the basis that periodic inspections of components in a lubricating environment are performed during maintenance activities, and that operating experience has shown no degraded conditions, the project team determined that the Oil Analysis Program is appropriate for the aging effects/mechanisms identified and provide assurance that the aging effects/mechanisms are effectively managed through the period of extended operation. The Oil Analysis Program was evaluated by the project team and found acceptable for managing aging degradation.

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.9.2 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.10 Loss of Material Due to Pitting and Crevice Corrosion

3.3.2.2.10.1 Loss of Material Due to Pitting and Crevice Corrosion [Item 1]

The project team reviewed PNPS LRA Section 3.3.2.2.10.1 against the criteria in SRP-LR Section 3.3.2.2.10.1.

SRP-LR Section 3.3.2.2.10.1 states that a loss of material due to pitting and crevice corrosion could occur in BWR and PWR steel piping with elastomer lining or stainless steel cladding that are exposed to treated water and treated borated water if the cladding or lining is degraded. The existing aging management program relies on monitoring and control of reactor water chemistry to manage the aging effects of loss of material from pitting and crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause pitting, or crevice corrosion. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from pitting and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the PNPS LRA Section 3.3.2.2.10.1, the applicant states that the loss of material due to pitting and crevice corrosion could occur in BWR and PWR steel piping with elastomer lining or stainless steel cladding that are exposed to treated water and treated borated water if the cladding or lining is degraded. For the auxiliary systems at PNPS no credit is taken for any elastomer linings or stainless steel cladding to prevent loss of material from the underlying carbon steel material such that the material is identified as carbon steel for the aging management review. This item is not applicable to PNPS.

Since no credit is taken for elastomer linings or stainless steel cladding to prevent loss of material from the underlying carbon steel material, the project team determined that this line item is not applicable to PNPS.

3.3.2.2.10.2 Loss of Material Due to Pitting and Crevice Corrosion [Item 2]

The project team reviewed PNPS LRA Section 3.3.2.2.10.2 against the criteria in SRP-LR Section 3.3.2.2.10.2.

SRP-LR Section 3.3.2.2.10.2 states that a loss of material due to pitting and crevice corrosion could occur for stainless steel and aluminum piping, piping components, piping elements, and for stainless steel and steel with stainless steel cladding heat exchanger components exposed to treated water. The existing aging management program relies on monitoring and control of reactor water chemistry to manage the aging effects of loss of material from pitting and crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause pitting, or crevice corrosion. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from pitting and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method to

ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the PNPS LRA Section 3.3.2.2.10.2, the applicant states that there are no aluminum components exposed to treated water in the auxiliary systems at PNPS. The loss of material due to pitting and crevice corrosion for stainless steel piping and components, and for stainless steel heat exchanger components exposed to treated water in the auxiliary systems at PNPS is managed by the Water Chemistry Control – BWR Program. The effectiveness of the program will be confirmed by the One-Time Inspection Program through an inspection of a representative sample of components crediting this program including susceptible locations such as areas of stagnant flow.

The project team reviewed and determined that the applicant's Plant Chemistry program exceptions were non-technical, the program is based on a more recent EPRI document for BWR water chemistry, versus the GALL Report recommended EPRI document BWRVIP-29 (TR-103515). The project team determined that the use of a more recent issue of the BWRVIP chemistry program document was acceptable. In the discussion column of Table 3.3.1, item 23 and item 24, the applicant stated that the One-Time Inspection (OTI) Program will be used to verify the effectiveness of the water chemistry program. However, for those line items in Table 3.3.2-X, where this Table 3.3.1 line item is referenced, only the Water Chemistry Control - BWR Program is credited. The project team asked the applicant a generic question to resolve the discrepancy why the OTI Program was not credited in the Table 2 line items that references this Table 1 line item.

In its response, the applicant stated that since the OTI Program is applicable to each water chemistry control program, it is also applicable to each line item in Table 2 that credits a water chemistry control program. LRA Table 3.3.1 indicates that the OTI Program is credited along with the water chemistry control programs for line items where GALL recommends a one-time inspection to confirm water chemistry control. Table 2 credits the OTI Program through reference to the associated Table 1 line item. The applicant further stated that the water chemistry control programs in LRA Appendices A and B will be revised to clearly indicate that the OTI Program will verify the effectiveness of the Water Chemistry Control - BWR Program.

In a letter dated July 19, 2006 **(MLxxxxxxxxx)**, the applicant stated that the effectiveness of the Water Chemistry Control – Auxiliary Systems, BWR, and Closed Cooling Water programs is confirmed by the One-Time Inspection program. For further clarification, LRA Appendix A is revised for these three water chemistry control programs to include the sentence "The One-Time Inspection Program will confirm the effectiveness of the program". **However, the LRA supplement has not added this sentence to Appendix B, Water Chemistry programs. {Open Item}**

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.10.2 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.10.3 Loss of Material Due to Pitting and Crevice Corrosion [Item 3]

The project team reviewed PNPS LRA Section 3.3.2.2.10.3 against the criteria in SRP-LR

Section 3.3.2.2.10.3.

SRP-LR Section 3.3.2.2.10.3 states that a loss of material due to pitting and crevice corrosion could occur for copper alloy HVAC piping, piping components, and piping elements exposed to condensation (external). The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1

In the PNPS LRA Section 3.3.2.2.10.3, the applicant states that the loss of material due to pitting and crevice corrosion for copper alloy components exposed to condensation (external) in the HVAC and other auxiliary systems is managed by the System Walkdown and Periodic Surveillance and Preventive Maintenance (PSPM) Programs. These programs include a periodic visual inspection and the PSPM Program includes other NDE techniques to manage loss of material of the components. These inspections will manage the aging effect of loss of material such that the intended function of the components will not be affected.

The project team reviewed the PSPM program, which states that for reactor building closed cycle cooling water system visual or other NDE techniques are used to inspect a representative sample of the in-scope RBCCW copper alloy cooling coils to manage loss of material. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since the heat exchanger tubes will be periodically inspected, the aging effect of loss of material of copper alloy >15% Zn heat exchanger tubes exposed to an external environment of condensation are effectively managed using the PSPM program.

The project team reviewed the System Walkdown Program which states that this program entails inspection of external surfaces of components subject to aging management review. This program is consistent with the GALL Report AMP XI.M36, "External Surfaces Monitoring Program". On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that the aging effect of loss of material of copper alloy components exposed to an external environment of condensation are effectively managed using the System Walkdown Program .

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.10.3 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.10.4 Loss of Material Due to Pitting and Crevice Corrosion [Item 4]

The project team reviewed PNPS LRA Section 3.3.2.2.10.4 against the criteria in SRP-LR Section 3.3.2.2.10.4.

SRP-LR Section 3.3.2.2.10.4 states that a loss of material due to pitting and crevice corrosion could occur for copper alloy piping, piping components, and piping elements exposed to lubricating oil. The existing aging management program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving

an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the lubricating oil program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the PNPS LRA Section 3.3.2.2.10.4, the applicant states that a loss of material due to pitting and crevice corrosion for copper alloy components exposed to lubricating oil in auxiliary systems at PNPS is managed by the Oil Analysis Program which includes periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. Operating experience at PNPS has confirmed the effectiveness of this program in maintaining contaminants within limits such that corrosion has not and will not affect the intended functions of these components.

The applicant depends on operating experience at PNPS to verify the effectiveness of the Oil Analysis Program. The project team asked the applicant how it can make this statement if inspection has not been performed. In its response, the applicant stated that during the performance of routine maintenance on components that contain lubricating oil, visual inspections of these components would identify degraded conditions that could be attributed to an ineffective Oil Analysis Program. The corrective action program at PNPS has a low threshold for the identification of degraded condition such that corrosion or cracking of components would be identified as part of this program. The review of operating experience at PNPS for the last five years did not identify any condition reports that indicated an ineffective Oil Analysis Program or that identified degraded component conditions such as corrosion or cracking in a lubricating oil environment.

During the past five years, many visual inspections of components containing lubricating oil have been performed during corrective and preventive maintenance activities. The visual inspection of these components would identify degraded conditions such as corrosion or cracking that could be attributed to an ineffective Oil Analysis Program. No condition reports that identified degraded component conditions, such as corrosion and cracking in a lubricating oil environment, were initiated as a result of these inspections. These past inspections at PNPS serve in lieu of a one-time inspection to provide confirmation of the effectiveness of the Oil Analysis Program.

The project team reviewed Operating Experience Review Report, LRPD-05, Revision 0, and confirmed that there were no condition reports generated for degraded conditions of components in a lubricating oil environment. On the basis that periodic inspections of components in a lubricating environment are performed during maintenance activities, and that operating experience has shown no degraded conditions, the project team determined that the Oil Analysis Program is appropriate for the aging effects/mechanisms identified and provide assurance that the aging effects/mechanisms are effectively managed through the period of extended operation. The Oil Analysis Program was evaluated by the project team and found acceptable for managing aging degradation.

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.10.4 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the

intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.10.5 Loss of Material Due to Pitting and Crevice Corrosion [Item 5]

The project team reviewed PNPS LRA Section 3.3.2.2.10.5 against the criteria in SRP-LR Section 3.3.2.2.10.5.

SRP-LR Section 3.3.2.2.10.5 states that a loss of material due to pitting and crevice corrosion could occur for HVAC aluminum piping, piping components, and piping elements and stainless steel ducting and components exposed to condensation. The GALL Report recommends further evaluation of a plantspecific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1

In the PNPS LRA Section 3.3.2.2.10.5, the applicant states that the loss of material due to pitting and crevice corrosion could occur for HVAC aluminum piping, piping components, and piping elements and stainless steel ducting and components exposed to condensation. At PNPS there are no aluminum components or stainless steel ducting exposed to condensation in the HVAC systems. However, this item can be applied to stainless steel components exposed to condensation, both internal and external, in other systems. The System Walkdown Program will manage loss of material in stainless steel components exposed externally to condensation. The Periodic Surveillance and Preventive Maintenance Program will manage loss of material in stainless steel components exposed internally to condensation. These programs include a periodic visual inspection and the PSPM Program includes other NDE techniques to manage loss of material of the components.

The stainless steel component types to which section 3.3.2.2.10.5 applies are identified in Table 3.3.2-X, which references Table 3.3.1, item 27. Two of these component types are in the EDG system in an internal environment of untreated air. Footnote 303 is applied to these components which states that the untreated air environment is the equivalent of the GALL Report environment of condensation. The PSPM Program will manage the aging effect of these two component types. The project team reviewed the PSPM program, which states that for EDG system visual or other NDE techniques are used to inspect a representative sample of the in-scope EDG components to manage loss of material. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since these components will be periodically inspected, the aging effect of loss of material of stainless steel components exposed to an internal environment of condensation are effectively managed using the PSPM program.

The other stainless steel component types are in various systems in an external environment of condensation. The aging effect of loss of material of these components is managed by the System Walkdown Program. The project team reviewed the System Walkdown Program which states that this program entails inspection of external surfaces of components subject to aging management review. This program is consistent with the GALL Report AMP XI.M36, "External Surfaces Monitoring Program". On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that the aging effect of loss of material of stainless steel components exposed to an external environment of condensation are effectively managed using the System Walkdown Program .

The project team found that, based on the programs identified above, the applicant has met the

criteria of SRP-LR Section 3.3.2.2.10.5 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.10.6 Loss of Material Due to Pitting and Crevice Corrosion [Item 6]

The project team reviewed PNPS LRA Section 3.3.2.2.10.6 against the criteria in SRP-LR Section 3.3.2.2.10.6.

SRP-LR Section 3.3.2.2.10.6 states that a loss of material due to pitting and crevice corrosion could occur for copper alloy fire protection system piping, piping components, and piping elements exposed to internal condensation. The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1

In the PNPS LRA Section 3.3.2.2.10.6, the applicant states that the loss of material due to pitting and crevice corrosion could occur for copper alloy fire protection system piping, piping components, and piping elements exposed to internal condensation. At PNPS there are no copper alloy components exposed to condensation in the Fire Protection systems. However, this item can be applied to copper alloy components exposed to internal condensation in other systems. The Periodic Surveillance and Preventive Maintenance and One-Time Inspection Programs will manage loss of material in copper alloy components exposed internally to untreated air, which is equivalent to condensation, through the use of visual inspections or other NDE techniques.

The PNPS Instrument Air Quality Program will manage loss of material in copper alloy components exposed internally to treated air. The instrument air quality maintains humidity and particulate within acceptable limits, thereby preserving the environment of treated air that is not conducive to corrosion. This is equivalent to the management of loss of material in steel and stainless steel components addressed in Item Numbers 3.3.1-53 and 54 respectively.

The component types to which section 3.3.2.2.10.6 applies are identified in Table 3.3.2-X, which references Table 3.3.1, item 28. One of these component types is in the EDG system in an internal environment of untreated air. Footnote 303 is applied to this component which states that the untreated air environment is the equivalent of the GALL Report environment of condensation. The PSPM Program will manage the aging effect of this component type. The project team reviewed the PSPM program, which states that for EDG system visual or other NDE techniques are used to inspect a representative sample of the in-scope EDG components to manage loss of material. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since these components will be periodically inspected, the aging effect of loss of material of copper alloy components exposed to an internal environment of condensation are effectively managed using the PSPM program. Four component types are in the instrument air system in an internal environment of condensation. The Instrument Air Quality Program will manage the aging effects of these components. The project team reviewed the Instrument Air Quality Program, which is a plant-specific program which ensures that instrument air supplied to components is maintained free of water and significant contaminants, thereby preserving an environment that is not conducive to loss of material. Dewpoint, particulate contamination, and hydrocarbon concentration are periodically checked to verify the instrument air quality is maintained. On the basis of its review

of the applicant's plant-specific and industry operating experience, the project team found that since instrument air quality will be periodically checked, the aging effect of loss of material of copper alloy components exposed to an internal environment of condensation are effectively managed using the Instrument Air Quality Program.

Three component types are in the compressed air system. These components are in scope per the requirements of criteria 10CFR 54.4(a)(2), non-safety related components affecting safety related systems. The One-Time Inspection program will manage the aging effects of these components. The project team reviewed the One-Time Inspection program, which is a new program consistent with the recommendations of GALL AMP XI.M32, "One-Time Inspection". This program provides confirmation for the potential long incubation period for certain aging effects on structures and components. The applicant has noted in the LRA, section B.1.23 that for internal surfaces of compressed air systems, a one-time inspection activity will confirm that loss of material in compressed air system are not occurring or are so insignificant that an aging management program is not warranted. The applicant also stated that when evidence of an aging effect is revealed by a one-time inspection, routine evaluation of the inspection results will identify appropriate corrective actions. The project team determined that use of the One-Time Inspection program alone in certain cases is acceptable. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since the One-Time Inspection program will visually inspect the internal surfaces prior to entering period of extended operation, the aging effect of loss of material of these components in compressed air system exposed to an internal environment of condensation are effectively managed using the One-Time Inspection Program.

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.10.6 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.10.7 Loss of Material Due to Pitting and Crevice Corrosion [Item 7]

The project team reviewed PNPS LRA Section 3.3.2.2.10.7 against the criteria in SRP-LR Section 3.3.2.2.10.7.

SRP-LR Section 3.3.2.2.10.7 states that a loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, and piping elements exposed to soil. The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1

In the PNPS LRA Section 3.3.2.2.10.7, the applicant states that the loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, and piping elements exposed to soil. At PNPS there are no stainless steel components exposed to soil in the Auxiliary systems. This item is not applicable to PNPS Auxiliary systems.

Since there are no stainless steel components exposed to soil in the auxiliary systems, the project team determined that this line item is not applicable to PNPS.

3.3.2.2.10.8 Loss of Material Due to Pitting and Crevice Corrosion [Item 8]

The project team reviewed PNPS LRA Section 3.3.2.2.10.8 against the criteria in SRP-LR Section 3.3.2.2.10.8.

SRP-LR Section 3.3.2.2.10.8 states that a loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, and piping elements of the BWR Standby Liquid Control System that are exposed to sodium pentaborate solution. The existing aging management program relies on monitoring and control of water chemistry to manage the aging effects of loss of material due to pitting and crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause loss of material due to pitting and crevice corrosion. Therefore, the GALL Report recommends that the effectiveness of the water chemistry control program should be verified to ensure this aging is not occurring. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that loss of material due to pitting and crevice corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the PNPS LRA Section 3.3.2.2.10.8, the applicant states that the loss of material due to pitting and crevice corrosion for stainless steel piping and components of the standby liquid control system exposed to sodium pentaborate solution is managed at PNPS by the Water Chemistry Control – BWR Program. The effectiveness of the Water Chemistry Control - BWR Program will be confirmed by the One-Time Inspection Program through an inspection of a representative sample of components crediting this program including susceptible locations such as areas of stagnant flow.

The project team reviewed and determined that the applicant's Plant Chemistry program exceptions were non-technical, the program is based on a more recent EPRI document for BWR water chemistry, versus the GALL Report recommended EPRI document BWRVIP-29 (TR-103515). The project team determined that the use of a more recent issue of the BWRVIP chemistry program document was acceptable. In the discussion column of Table 3.3.1, item 30, the applicant stated that the One-Time Inspection (OTI) Program will be used to verify the effectiveness of the water chemistry program. However, for those line items in Table 3.3.2-X, where this Table 3.3.1 line item is referenced, only the Water Chemistry Control - BWR Program is credited. The project team asked the applicant a generic question to resolve the discrepancy why the OTI Program was not credited in the Table 2 line items that references this Table 1 line item.

In its response, the applicant stated that since the OTI Program is applicable to each water chemistry control program, it is also applicable to each line item in Table 2 that credits a water chemistry control program. LRA Table 3.3.1 indicates that the OTI Program is credited along with the water chemistry control programs for line items where GALL recommends a one-time inspection to confirm water chemistry control. Table 2 credits the OTI Program through reference to the associated Table 1 line item. The applicant further stated that the water chemistry control programs in LRA Appendices A and B will be revised to clearly indicate that the OTI Program will verify the effectiveness of the Water Chemistry Control - BWR Program.

In a letter dated July 19, 2006 **(MLxxxxxxxxx)**, the applicant stated that the effectiveness of the Water Chemistry Control – Auxiliary Systems, BWR, and Closed Cooling Water programs is confirmed by the One-Time Inspection program. For further clarification, LRA Appendix A is revised for these three water chemistry control programs to include the sentence "The One-

Time Inspection Program will confirm the effectiveness of the program". **However, the LRA supplement has not added this sentence to Appendix B, Water Chemistry programs. {Open Item}**

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.10.8 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.11 Loss of Material Due to Pitting, Crevice, and Galvanic Corrosion

The project team reviewed PNPS LRA Section 3.3.2.2.11 against the criteria in SRP-LR Section 3.3.2.2.11.

SRP-LR Section 3.3.2.2.11 states that a loss of material due to pitting, crevice, and galvanic corrosion could occur for copper alloy piping, piping components, and piping elements exposed to treated water. Therefore, the GALL Report recommends that the effectiveness of the water chemistry control program should be verified to ensure this aging is not occurring. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that loss of material due to pitting and crevice corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the PNPS LRA Section 3.3.2.2.11, the applicant states that the loss of material due to pitting, crevice, and galvanic corrosion could occur for copper alloy piping and components exposed to treated water. At PNPS there are no copper alloy components exposed to treated water in the auxiliary systems. However, this item can be applied to copper alloy components exposed to treated water in the high pressure coolant injection and reactor core isolation cooling systems. The Water Chemistry Control – BWR Program will manage loss of material for these components. The effectiveness of the program will be confirmed by the One-Time Inspection Program through an inspection of a representative sample of components crediting this program including susceptible locations such as areas of stagnant flow.

This line item is not used for any components in the auxiliary system. However, it is used in section 3.2, ESF systems. In the discussion column of Table 3.3.1, item 31, the applicant stated that the One-Time Inspection (OTI) Program will be used to verify the effectiveness of the water chemistry program. However, for those line items in Table 3.2.2-X, where this Table 3.3.1 line item is referenced, only the Water Chemistry Control - BWR Program is credited. The project team asked the applicant a generic question to resolve the discrepancy why the OTI Program was not credited in the Table 2 line items that references this Table 1 line item.

In its response, the applicant stated that since the OTI Program is applicable to each water chemistry control program, it is also applicable to each line item in Table 2 that credits a water chemistry control program. LRA Table 3.3.1 indicates that the OTI Program is credited along with the water chemistry control programs for line items where GALL recommends a one-time inspection to confirm water chemistry control. Table 2 credits the OTI Program through reference to the associated Table 1 line item. The applicant further stated that the water chemistry control programs in LRA Appendices A and B will be revised to clearly indicate that the OTI Program will verify the effectiveness of the Water Chemistry Control - BWR Program.

In a letter dated July 19, 2006 **(MLxxxxxxxxx)**, the applicant stated that the effectiveness of the Water Chemistry Control – Auxiliary Systems, BWR, and Closed Cooling Water programs is confirmed by the One-Time Inspection program. For further clarification, LRA Appendix A is revised for these three water chemistry control programs to include the sentence "The One-Time Inspection Program will confirm the effectiveness of the program". **However, the LRA supplement has not added this sentence to Appendix B, Water Chemistry programs. {Open Item}**

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.11 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.12 Loss of Material Due to Pitting, Crevice, and Microbiologically-Influenced Corrosion

3.3.2.2.12.1 Loss of Material Due to Pitting, Crevice, and Microbiologically-Influenced Corrosion [Item 1]

The project team reviewed PNPS LRA Section 3.3.2.2.12.1 against the criteria in SRP-LR Section 3.3.2.2.12.1.

SRP-LR Section 3.3.2.2.12.1 states that a loss of material due to pitting, crevice, and MIC could occur in stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to fuel oil. The existing aging management program relies on the fuel oil chemistry program for monitoring and control of fuel oil contamination to manage loss of material due to corrosion. However, corrosion may occur at locations where contaminants accumulate and the effectiveness of fuel oil chemistry control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the fuel oil chemistry control program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the PNPS LRA Section 3.3.2.2.12.1, the applicant states that there are no aluminum components exposed to fuel oil in the auxiliary systems at PNPS. The loss of material due to pitting, crevice, and MIC in stainless steel and copper alloy piping, and components exposed to fuel oil is an aging effect requiring management at PNPS and these components are managed by the Diesel Fuel Monitoring Program. This program includes sampling and monitoring of fuel oil quality to ensure they remain within the limits specified by the ASTM standards. Maintaining parameters within limits ensures that significant loss of material will not occur. Operating experience at PNPS has confirmed the effectiveness of this program in maintaining fuel oil quality within limits such that loss of material will not affect the intended functions of these stainless steel and copper alloy components.

The project team reviewed the Diesel Fuel Monitoring Program, which includes sampling and monitoring of fuel oil quality. In lieu of using the One-Time Inspection Program to verify effectiveness, the applicant performs UT inspections of tank bottoms, which is where corrosion is likely to occur due to any water accumulation. Since the most susceptible location will be

inspected for loss of material, the project team determined that the performance of UT inspection of bottom of storage tank is an acceptable method of verifying the effectiveness of the Diesel Fuel Monitoring Program.

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.12.1 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.12.2 Loss of Material Due to Pitting, Crevice, and Microbiologically-Influenced Corrosion [Item 2]

The project team reviewed PNPS LRA Section 3.3.2.2.12.2 against the criteria in SRP-LR Section 3.3.2.2.12.2.

SRP-LR Section 3.3.2.2.12.2 states that a loss of material due to pitting, crevice, and MIC could occur in stainless steel piping, piping components, and piping elements exposed to lubricating oil. The existing program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the lubricating oil program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the PNPS LRA Section 3.3.2.2.12.2, the applicant states that a loss of material due to pitting, crevice, and MIC in stainless steel piping and components exposed to lubricating oil is managed by the Oil Analysis Program which includes periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. Operating experience at PNPS has confirmed the effectiveness of this program in maintaining contaminants within limits such that corrosion has not and will not affect the intended functions of these components.

The applicant depends on operating experience at PNPS to verify the effectiveness of the Oil Analysis Program. The project team asked the applicant how it can make this statement if inspection has not been performed. In its response, the applicant stated that during the performance of routine maintenance on components that contain lubricating oil, visual inspections of these components would identify degraded conditions that could be attributed to an ineffective Oil Analysis Program. The corrective action program at PNPS has a low threshold for the identification of degraded condition such that corrosion or cracking of components would be identified as part of this program. The review of operating experience at PNPS for the last five years did not identify any condition reports that indicated an ineffective Oil Analysis Program or that identified degraded component conditions such as corrosion or cracking in a lubricating oil environment.

During the past five years, many visual inspections of components containing lubricating oil have been performed during corrective and preventive maintenance activities. The visual

inspection of these components would identify degraded conditions such as corrosion or cracking that could be attributed to an ineffective Oil Analysis Program. No condition reports that identified degraded component conditions, such as corrosion and cracking in a lubricating oil environment, were initiated as a result of these inspections. These past inspections at PNPS serve in lieu of a one-time inspection to provide confirmation of the effectiveness of the Oil Analysis Program.

The project team reviewed Operating Experience Review Report, LRPD-05, Revision 0, and confirmed that there were no condition reports generated for degraded conditions of components in a lubricating oil environment. On the basis that periodic inspections of components in a lubricating environment are performed during maintenance activities, and that operating experience has shown no degraded conditions, the project team determined that the Oil Analysis Program is appropriate for the aging effects/mechanisms identified and provide assurance that the aging effects/mechanisms are effectively managed through the period of extended operation. The Oil Analysis Program was evaluated by the project team and found acceptable for managing aging degradation.

The project team found that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.12.2 for further evaluation. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.13 Loss of Material Due to Wear

The project team reviewed PNPS LRA Section 3.3.2.2.13 against the criteria in SRP-LR Section 3.3.2.2.13.

SRP-LR Section 3.3.2.2.13 states that a loss of material due to wear could occur in the elastomer seals and components exposed to air indoor uncontrolled (internal or external). The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

In the PNPS LRA Section 3.3.2.2.13, the applicant states that a loss of material due to wear could occur in the elastomer seals and components exposed to air indoor uncontrolled (internal or external). Wear is the removal of surface layers due to relative motion between two surfaces. At PNPS, in the auxiliary systems, this specific aging effect for elastomers is not applicable based on operating experience. Where the aging effects of change in material properties and cracking are identified for elastomer components, they are managed by the Periodic Surveillance and Preventive Maintenance Program. This item is not applicable to PNPS auxiliary systems.

Since there are no elastomer components with wear as an aging effect, the project team determined that this line item is not applicable to PNPS.

3.3.2.2.15 Quality Assurance for Aging Management of Non-safety-Related Components

The applicant referenced LRA Section B.0.3. The project team's evaluation of Section B.0.3 is provided in Section 3.0.4 of this audit and review report.

Conclusion

On the basis of its review, for component groups evaluated in the GALL Report for which the GALL Report recommends further evaluation, the project team determined that the applicant adequately addressed the issues that were further evaluated. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.3 *AMR Results That Are Not Consistent With The GALL Report Or Not Addressed In The GALL Report*

Summary of Information in the Application

In PNPS LRA Table 3.3.1, Summary of Aging Management Evaluations for the Auxiliary Systems, the applicant provided information regarding components or material/environment combination in the GALL Report that it evaluated and identified as not applicable to its plant.

In PNPS LRA Tables 3.3.2-1 through 3.3.2-13, 3.3.2-14- 2, 3.3.2-14-6, 3.3.2.14-8, 3.3.2.1-14-12 through 3.3.2-14-15, 3.3.2-14-19 through 3.3.2-14-24, 3.3.2-14-26, 3.3.2-14-27, and 3.3.2-14-29 through 3.3.2-14-34, the applicant provided additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report. Specifically, the applicant indicated, via Notes F through J, that neither the identified component nor the material/environment combination is evaluated in the GALL Report and provided information concerning how the aging effect requiring management will be managed.

Project Team Evaluation

The project team reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report.

Aging Effect/Mechanism in Table 3.3.1 That Are Not Applicable for PNPS

The project team reviewed PNPS LRA Table 3.3.1, which provides a summary of aging management evaluations for the auxiliary systems evaluated in the GALL Report.

In PNPS LRA Table 3.1.1, Item 39 discussion column, the applicant stated that cracking of stainless steel BWR spent fuel storage racks exposed to treated water >60°C (>140°F) due to stress corrosion cracking is not applicable because there are no stainless steel spent fuel storage components with intended functions exposed to treated water >140°F.

On the basis that there are no stainless steel spent fuel storage components with intended functions exposed to treated water >140°F, the project team found that, for this component type, this aging effect is not applicable to PNPS.

In PNPS LRA Table 3.1.1, Item 41 discussion column, the applicant stated that cracking of high-strength steel closure bolting exposed to air with steam or water leakage due to cyclic loading and stress corrosion cracking is not applicable because high-strength steel closure bolting is

not used in auxiliary systems.

On the basis that high-strength steel closure bolting is not used in auxiliary systems, the project team found that, for this component type, this aging effect is not applicable to PNPS.

In PNPS LRA Table 3.1.1, Item 62 discussion column, the applicant stated that loss of material of aluminum piping, piping components, and piping elements exposed to raw water due to pitting and crevice corrosion is not applicable because there are no aluminum components with intended functions exposed to raw water in the auxiliary systems.

On the basis that there are no aluminum components with intended functions exposed to raw water in the auxiliary systems, the project team found that, for this component type, this aging effect is not applicable to PNPS.

In PNPS LRA Table 3.1.1, Item 77 discussion column, the applicant stated that loss of material of steel heat exchanger components exposed to raw water due to crevice, galvanic, and microbiologically influenced corrosion, and fouling is not applicable because steel heat exchanger components are not exposed to raw water in the auxiliary systems.

On the basis that steel heat exchanger components are not exposed to raw water in the auxiliary systems, the project team found that, for this component type, this aging effect is not applicable to PNPS.

In PNPS LRA Table 3.1.1, Item 80 discussion column, the applicant stated that loss of material of stainless steel and copper alloy piping, piping components, and piping elements exposed to raw water due to pitting, crevice and microbiologically influenced corrosion is not applicable because this line applies to EDG system components. At PNPS, these components are not exposed to raw water.

On the basis that at PNPS, these components are not exposed to raw water, the project team found that, for this component type, this aging effect is not applicable to PNPS.

In PNPS LRA Table 3.1.1, Item 98 discussion column, the applicant stated that AE/AMP combination "None-None" for steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to dried air is not applicable because at PNPS dried (treated) air is maintained as an environment as a result of using the Instrument Air Quality Program, so it is possible aging effects may occur without that program.

On the basis that PNPS assumes that steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to dried air could have aging effects, the project team found that, for this component type, this aging effect is not applicable to PNPS.

<u>Auxiliary Systems AMR Line Items That Has No Aging Effect (PNPS LRA Tables 3.3.2-1 through 3.3.2-13, 3.3.2-14- 2, 3.3.2-14-6, 3.3.2.14-8, 3.3.2.1-14-12 through 3.3.2-14-15, 3.3.2-14-19 through 3.3.2-14-24, 3.3.2-14-26, 3.3.2-14-27, and 3.3.2-14-29 through 3.3.2-14-34)</u>

In PNPS LRA Tables 3.3.2-1 through 3.3.2-13, 3.3.2-14- 2, 3.3.2-14-6, 3.3.2.14-8, 3.3.2.1-14-12 through 3.3.2-14-15, 3.3.2-14-19 through 3.3.2-14-24, 3.3.2-14-26, 3.3.2-14-27, and 3.3.2-14-29 through 3.3.2-14-34, the applicant identified line-items where no aging effects

were identified as a result of its aging review process.

Specifically, instances in which the applicant states that no aging effects were identified occurred when components fabricated from aluminum, glass, titanium, copper ally >15% Zn, Copper Alloy <15% Zn, plastic, fibregalss, and stainless steel material exposed to condensation external, air-indoor internal, fuel oil, and various other environments.

Aluminum in air-outdoor, internal and external environment.

Aluminum has an excellent resistance to corrosion when exposed to humid air (outdoor environment) the aluminum oxide film is bonded strongly to its surface and that, if damaged, reforms immediately in most environments. On a surface freshly abraded and then exposed to air, the oxide film is only 5 to 10 nanometer thick but is highly effective in protecting the aluminum from corrosion. Therefore, aluminum exposed to outdoor air environment does not have any applicable aging effect.

Glass in condensation external environment

Glass as a material is impervious to normal plant environments. This conclusion is based on the fact that no failure due to an aging effect of glass components in environments free of hydrofluoric acid, caustics, or hot water have been recorded in industry at the temperatures or during the time periods of concern for extended operation.

Titanium in condensation external environment

The corrosion resistance of titanium is a result of formation of a continuous, stable, highly adherent protective oxide layer on the metal surface. The metal itself is very reactive with a high affinity for oxygen and reforms damage to this layer instantaneously. Therefore, titanium exposed to condensation environment does not have any applicable aging effect.

Copper alloy >15% Zn in air-indoor internal environment

Copper alloy >15% Zn in air-indoor internal environment does not have any aging effect. This conclusion is based on the fact that comprehensive tests conducted over a 20-year period under the supervision of ASTM have confirmed the suitability of copper and copper alloys for atmospheric exposure as cited in Metals Handbook, Volume 13, Corrosion, American Society for Metals, 1987.

Copper alloy <15% Zn in air-indoor internal environment

Copper alloy <15% Zn in air-indoor internal environment does not have any aging effect. This conclusion is based on the fact that comprehensive tests conducted over a 20-year period under the supervision of ASTM have confirmed the suitability of copper and copper alloys for atmospheric exposure as cited in Metals Handbook, Volume 13, Corrosion, American Society for Metals, 1987.

Plastic in various environments (Need to ask PNPS what plastic material they are using)

In the LRA, the applicant has used plastics as a generic term. The project team asked the applicant to identify what kind of plastic materials are used at PNPS. In its response, the

applicant stated that at PNPS piping codes JE, JF, JG and HT are plastic or fibreglass. As identified in the PNPS specification for piping M-300, pipe class JE is fibreglass reinforced plastic, piping code JF allows the use of polyvinyl chloride (PVC) piping, and class HT piping is PVC. Per note 3 on M211, some of the pipe code JG is PVC.

Some specific components are also identified as plastics that are not included in the piping class summary sheets which required component specific reviews to identify the material. For instance some components such as the tank shown on M212 sheet 1 is identified on the drawing as a 55 gallon PVC drum and some piping like the piping on M273 sheet 3 is identified on the drawing is chlorinated polyvinyl chloride (CPVC).

The fuel oil system table 3.3.2-7 also identifies a plastic filter housing used on the station blackout diesel fuel oil filter X-176. These are plastic bowls at the bottom of the filter housing that collect water and sediment. The exact type of plastic is not known but was selected for use by the original manufacturer in this application. In addition, similar to all the plastic materials described above it is not exposed to direct sunlight and was designed to be used with fuel oil. Therefore, as stated in the EPRI Mechanical Tools none of these components is expected to experience aging effects that require management in the environments to which they are exposed.

PVC is unaffected by water, concentrated alkalies, and non-oxidizing acids, oils and ozone. PVC is also unaffected by sunlight and humidity changes.

Unlike metals, thermoplastics do not display corrosion rates. Rather than depending on an oxide layer for protection, they depend on chemical resistance to the environment to which they are exposed. The use of thermoplastics in a water environment is a design driven criteria.

Fibreglass reinforced plastic is similarly impervious to normal plant environments Chlorinated PVC is a stringer version of PVC and is not susceptible to age degradation is normal plant environments.

Therefore based on industry experience review and the assumption of proper design and application of the material, aging of thermoplastics in treated water, raw water, and fuel oil environment is not an applicable aging effect.

Fibreglass in fuel oil and soil environment

Fibreglass is used in fuel oil and soil environment because of its corrosive resistance. Fuel oil does not contain hydrofluoric acids or caustics. Therefore fiberglass in fuel oil environment does not have any aging effect.

Stainless steel in an air-indoor internal environment

Stainless steels are highly resistant to corrosion in dry atmospheres in the absence of corrosive species, (which would be reflective of indoor uncontrolled air) as cited in Metals Handbook, Volumes 3 (p. 65) and 13 (p. 555), Ninth Edition, American Society for Metals International, 1980 and 1987. Components are not subject to moisture in a dry air environment (and indoor uncontrolled air would have limited humidity and condensation). Therefore, stainless steel in an indoor, uncontrolled air environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the

period of extended operation.

Fluoropolymer (teflon) in treated air internal environment

Unlike metals, fluoropolymer (teflon) does not display corrosion rates. Rather than depending on an oxide layer for protection, it depends on chemical resistance to the environment to which they are exposed. Teflon is highly resistant to normal environments. It degrades in a radiation environment, however, in a treated air internal environment, such as instrument air, teflon is impervious to aging effect. Therefore, fluoropolymer (teflon) in a treated air internal environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

Stainless steel braid/teflon liner in air-indoor internal environment

Unlike metals, teflon does not display corrosion rates. Rather than depending on an oxide layer for protection, it depends on chemical resistance to the environment to which they are exposed. It degrades in a radiation environment, however, in an air-indoor internal environment, teflon is impervious to aging effect. Therefore, teflon in an air-indoor internal environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

Stainless steel braid/teflon liner in halon internal environment

Unlike metals, teflon does not display corrosion rates. Rather than depending on an oxide layer for protection, it depends on chemical resistance to the environment to which they are exposed. It degrades in a radiation environment, however, in an inert gas environment such as halon, teflon is impervious to aging effect. Therefore, teflon in a halon internal environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

Stainless steel in an air-outdoor environment

In some Table 2's, PNPS has stated "None-None" for AE/AMP combination for stainless steel bolting in an air-outdoor environment, however, in Tables 3.3.2-5 and 3.3.2-9, PNPS identified loss of material as an aging effect for the same material/environment combination and credited the system walkdown program to manage this aging effect. The applicant was asked to clarify this discrepancy.

In its response, the applicant stated that the only table that did not identify loss of material for stainless steel bolting in an air-outdoor environment was Table 3.3.2-7 for the fuel oil system. Loss of material is an aging effect requiring management that should have been identified for the stainless steel bolting with an environment of air-outdoor.

In a letter dated July 19, 2006 **(MLxxxxxxxxx)**, the applicant stated that LRA Table 3.3.2-7 line item for component bolting, material stainless steel, environment air – outdoor is revised as follows.

Bolting// Pressure boundary//stainless steel//air – outdoor (ext) // Loss of material // Bolting Integrity // // // G

The letter also included a write-up of B.1.33, Bolting Integrity Program. The evaluation of this program is documented in section 3.0.3.2.20 of this audit and review report.

On the basis of its review of current industry research and operating experience, the project team found that condensation external, air-indoor internal, fuel oil, and various other environments on aluminum, glass, titanium, copper ally >15% Zn, copper alloy <15% Zn, plastic, fibreglass, and stainless steel material will not result in aging that will be of concern during the period of extended operation. Therefore, the project team concluded that there are no applicable aging effects requiring management for aluminum, glass, titanium, copper ally >15% Zn, copper alloy <15% Zn, plastic, fibreglass, and stainless steel material components exposed to condensation external, air-indoor internal, fuel oil, and various other environments.

On the basis of its audit and review of the applicant's program, the project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.3.1 Standby Liquid Control system- Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-1

The project team reviewed the PNPS LRA Table 3.3.2-1, which summarizes the results of AMR evaluations for the standby liquid control system component groups.

In LRA Table 3.3.2-1, the applicant proposed to manage loss of material of carbon steel coated materials for components type of tank exposed to sodium pentaborate internal environment using PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM).

The project team reviewed the PSPM program and its evaluation is documented in Section 3.0.3.3.5 of this audit and review report. The PSPM program description states that for standby liquid control system UT or other NDE techniques are used to verify remaining wall thickness to manage loss of material from internal surfaces of the carbon steel discharge accumulators (component group - tank). On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since the wall thickness will be periodically measured, the aging effect of loss of material of carbon steel coated tank exposed to sodium pentaborate internal environment are effectively managed using the PSPM program. On this basis, the project team found that management of loss of material in standby control system is acceptable.

3.3.2.3.2 Salt Service Water System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-2

The project team reviewed the PNPS LRA Table 3.3.2-2, which summarizes the results of AMR evaluations for the salt service water system component groups.

In Table 3.3.2-2, the applicant proposed to manage loss of material for nickel alloy material for component types of bolting and valve body exposed to an external environment of condensation using PNPS AMP B.1.30, "System Walkdown Program".

The project team reviewed the System Walkdown Program and its evaluation is documented in

Section 3.0.3.1.11 of this audit and review report. The system walkdown program description states that this program entails inspection of external surfaces of components subject to aging management review. This program is consistent with the GALL Report AMP XI.M36, "External Surfaces Monitoring Program". On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that the aging effect of loss of material of nickel alloy bolting and valve body exposed to an external environment of condensation are effectively managed using the Service Water Integrity Program.

In Table 3.3.2-2, the applicant proposed to manage loss of material for titanium material for component types of piping and thermowells exposed to an environment of raw water using PNPS AMP B.1.28, "Service Water Integrity Program".

The project team reviewed the Service Water Integrity Program and its evaluation is documented in Section 3.0.3.2.16 of this audit and review report. The service water integrity program includes surveillance and control techniques such as visual inspection, eddy current testing and other NDE techniques to manage aging effects caused by biofouling, corrosion, erosion, protective coating failures, and silting in the SSW system or structures and components serviced by the SSW system. The project team reviewed the applicant's plant-specific operating experience and found that a number of components in 2004 had revealed areas of erosion and corrosion on the internal and external surfaces. The inspections also found that the lining in original carbon steel rubber lined piping had deteriorated. The applicant has since replaced the components using corrosion resistant materials such as titanium. Identification of the degradation and appropriate corrective action provide adequate assurance that the program is effective. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that the aging effect of loss of material of titanium piping and thermowells exposed to an environment of raw water are effectively managed using the Service Water Integrity Program .

In Table 3.3.2-2, the applicant proposed to manage loss of material for copper alloy <15% Zn material for component types of heat exchanger tubes exposed to an external environment of treated water using PNPS AMP B.1.28, "Service Water Integrity Program".

The project team reviewed the Service Water Integrity Program and its evaluation is documented in Section 3.0.3.2.16 of this audit and review report. The service water integrity program includes surveillance and control techniques such as visual inspection, eddy current testing and other NDE techniques to manage aging effects caused by biofouling, corrosion, erosion, protective coating failures, and silting in the SSW system or structures and components serviced by the SSW system. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that the aging effect of loss of material of copper alloy <15% Zn heat exchanger tubes exposed to an external environment of treated water is effectively managed using the Service Water Integrity Program .

In Table 3.3.2-2, the applicant proposed to manage loss of material for titanium material for component types of piping exposed to an external environment of soil using PNPS AMP B.1.2, "Buried Piping and Tanks Inspection Program".

The project team reviewed the Buried Piping and Tanks Inspection Program and its evaluation is documented in Section 3.0.3.2.1 of this audit and review report. The buried piping and tanks inspection program is a new program that includes inspections of buried titanium components to manage the effects of loss of material due to corrosion. Buried components are inspected when

excavated during maintenance. Although this is a new program, it will be consistent with GALL Report AMP XI.M34, "Buried Piping and Tanks Inspection", with an exception where the applicant may use methods such as phased array UT technology for wall thickness measurement of buried piping without excavation. If an opportunistic inspection cannot occur within a ten-year period, focused inspection will be performed. On this basis, the project team found that the aging effect of loss of material of titanium piping exposed to an external environment of soil is effectively managed using the Buried Piping and Tanks Inspection Program

3.3.2.3.3 Reactor Building Closed Cooling Water System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-3

The project team reviewed the PNPS LRA Table 3.3.2-3, which summarizes the results of AMR evaluations for the reactor building closed cooling water system component groups.

In Table 3.3.2-3, the applicant proposed to manage loss of material for copper alloy <15% Zn material for component types of heat exchanger tubes exposed to an external environment of treated water using PNPS AMP B.1.28, "Service Water Integrity Program".

The project team reviewed the Service Water Integrity Program and its evaluation is documented in Section 3.0.3.2.16 of this audit and review report. The service water integrity program includes surveillance and control techniques such as visual inspection, eddy current testing and other NDE techniques to manage aging effects caused by biofouling, corrosion, erosion, protective coating failures, and silting in the SSW system or structures and components serviced by the SSW system. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that the aging effect of loss of material of copper alloy <15% Zn heat exchanger tubes exposed to an external environment of treated water is effectively managed using the Service Water Integrity Program.

In Table 3.3.2-3, the applicant proposed to manage loss of material for copper alloy >15% Zn material for component types of heat exchanger tubes exposed to an external environment of air-indoor using PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM).

The project team reviewed the PSPM program and its evaluation is documented in Section 3.0.3.3.5 of this audit and review report. The PSPM program description states that for reactor building closed cycle cooling water system visual or other NDE techniques are used to inspect a representative sample of the in-scope RBCCW copper alloy cooling coils to manage loss of material. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since the heat exchanger tubes will be periodically inspected, the aging effect of loss of material of copper alloy >15% Zn heat exchanger tubes exposed to an external environment of indoor-air are effectively managed using the PSPM program.

In Table 3.3.2-3, the applicant proposed to manage loss of material for copper alloy >15% Zn material for component types of heat exchanger tubes exposed to an external environments of treated water and lube oil using PNPS AMP B.1.15, "Heat Exchanger Monitoring Program".

The project team reviewed the Heat Exchanger Monitoring Program and its evaluation is documented in Section 3.0.3.3.1 of this audit and review report. The heat exchanger monitoring

program is a new plant-specific program that will inspect heat exchangers for degradation. Representative tubes within the sample population of heat exchangers will be eddy current tested at a frequency determined by internal and external operating experience to ensure that effects of aging are identified prior to loss of intended function. Along with each eddy current test, visual inspections will be performed on accessible heat exchanger heads, covers and tube sheets to monitor surface condition for indications of loss of material. On the basis that the EDG lube oil coolers and the HPCI gland seal condenser that are included in the sample population have the same material and environment as the heat exchangers in the reactor building cooling water system, the project team found that the aging effect of loss of material of copper alloy >15% Zn heat exchanger tubes exposed to an external environment of treated water and lube oil are effectively managed using the Heat Exchanger Monitoring Program

3.3.2.3.4 Emergency Diesel Generator System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-4

The project team reviewed the PNPS LRA Table 3.3.2-4, which summarizes the results of AMR evaluations for the emergency diesel generator system component groups.

In Table 3.3.2-4, the applicant proposed to manage loss of material for copper alloy >15% Zn material for component types of heat exchanger tubes exposed to an external environments of treated water and lube oil using PNPS AMP B.1.15, "Heat Exchanger Monitoring Program".

The project team reviewed the Heat Exchanger Monitoring Program and its evaluation is documented in Section 3.0.3.3.1 of this audit and review report. The heat exchanger monitoring program is a new plant-specific program that will inspect heat exchangers for degradation. Representative tubes within the sample population of heat exchangers will be eddy current tested at a frequency determined by internal and external operating experience to ensure that effects of aging are identified prior to loss of intended function. Along with each eddy current test, visual inspections will be performed on accessible heat exchanger heads, covers and tube sheets to monitor surface condition for indications of loss of material. On the basis that the EDG lube oil coolers are included in the sample population, the project team found that the aging effect of loss of material of copper alloy >15% Zn heat exchanger tubes exposed to an external environment of treated water and lube oil are effectively managed using the Heat Exchanger Monitoring Program .

In Table 3.3.2-4, the applicant proposed to manage loss of material for copper alloy >15% Zn material for component types of heat exchanger tubes exposed to an external environment of air-indoor and air-outdoor using PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM).

The project team reviewed the PSPM program and its evaluation is documented in Section 3.0.3.3.5 of this audit and review report. The PSPM program description states that for emergency diesel generator system, PNPS visually inspects A/B EDG jacket water radiators to manage loss of material and fouling. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since the heat exchanger tubes will be periodically inspected, the aging effect of loss of material of copper alloy >15% Zn heat exchanger tubes exposed to an external environment of indoor-air and air-outdoor are effectively managed using the PSPM program.

In Table 3.3.2-4, the applicant proposed to manage fouling of copper alloy >15% Zn material for

component types of heat exchanger tubes exposed to an external environment of air-indoor and air-outdoor using PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM).

The project team reviewed the PSPM program and its evaluation is documented in Section 3.0.3.3.5 of this audit and review report. The PSPM program description states that for emergency diesel generator system, PNPS performs EDG surveillance test (loaded) to manage fouling for heat exchanger tubes. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since the heat exchanger tubes will be periodically tested, the aging effect of fouling of copper alloy >15% Zn heat exchanger tubes exposed to an external environment of indoor-air and air-outdoor are effectively managed using the PSPM program.

In Table 3.3.2-4, the applicant proposed to manage cracking of stainless steel material for component types of strainers and valve body exposed to an internal and external environment of lube oil using PNPS AMP B.1.22, "Oil Analysis Program".

The project team reviewed the Oil Analysis Program and its evaluation is documented in Section 3.0.3.2.13 of this audit and review report. The oil analysis program description states that program maintains oil systems free of contaminants (primarily water and particulates) thereby preserving an environment that is not conducive to loss of material, cracking, or fouling. Sampling frequencies are based on vendor recommendations, accessibility during plant operation, equipment importance to plant operation, and previous test results. The applicant depends on operating experience at PNPS to verify the effectiveness of the Oil Analysis Program. The project team asked the applicant how it can make this statement if inspection has not been performed. The applicant's response and its evaluation is documented in section 3.3.2.1.17 of this audit and review report.

In Table 3.3.2-4, the applicant proposed to manage cracking due to fatigue of stainless steel and carbon steel material for component types of expansion joint, turbocharger housing, piping, and silencer exposed to an internal environment of exhaust gas and air-untreated using metal fatigue TLAA.

The project team reviewed TLAA section 4.3.2, Non-Class 1 Fatigue, and its evaluation is documented in section 4.3.2 of the SER. However, it is not clear if expansion joints and turbocharger housing are included in this section. The project team asked the applicant to clarify if these components were included in the TLAA section 4.3.2. The project team also asked the applicant to justify why PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM) is not credited for inspection of these components. The program description does include visual or NDE inspection of EDG exhaust components.

In its response, the applicant stated that the expansion joints and turbocharger were designed per the requirements of B31.1 for a limited number of thermal cycles. The evaluation of fatigue is therefore discussed in section 4.3.2. The applicant further stated that the exhaust systems of station blackout and security diesel generators are not designed to a code or standard where thermal cycles are a consideration. Therefore, the PSPM will manage the aging effect of cracking due to thermal fatigue. On this basis, the project team found the applicant response to be acceptable.

3.3.2.3.5 Station Blackout Diesel Generator System - Summary of Aging Management

Evaluation - PNPS LRA Table 3.3.2-5

The project team reviewed the PNPS LRA Table 3.3.2-5, which summarizes the results of AMR evaluations for the station blackout diesel generator system component groups.

In Table 3.3.2-5, the applicant proposed to manage loss of material of stainless steel material for component types of bolts exposed to an external environment of air outdoor using PNPS AMP B.1.30, "System Walkdown Program".

The project team reviewed the System Walkdown Program and its evaluation is documented in Section 3.0.3.1.11 of this audit and review report. The system walkdown program description states that this program entails inspection of external surfaces of components subject to aging management review. This program is consistent with the GALL Report AMP XI.M36, "External Surfaces Monitoring Program". On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that the aging effect of loss of material of stainless steel bolting exposed to an external environment of air-outdoor are effectively managed using the System Walkdown Program .

In Table 3.3.2-5, the applicant proposed to manage fouling of copper alloy >15% Zn material for component types of heat exchanger tubes exposed to an external environment of air-indoor using PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM).

The project team reviewed the PSPM program and its evaluation is documented in Section 3.0.3.3.5 of this audit and review report. The PSPM program description states that for station blackout diesel generator system, PNPS performs SBD generator surveillance test (loaded) to manage fouling for heat exchanger tubes. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since the heat exchanger tubes will be periodically tested, the aging effect of fouling of copper alloy >15% Zn heat exchanger tubes exposed to an external environment of indoor-air are effectively managed using the PSPM program.

In Table 3.3.2-5, the applicant proposed to manage fouling of aluminum material for component types of heat exchanger fins and loss of material for stainless steel radiator tubes exposed to an external environment of air-indoor or air-outdoor using PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM).

The project team reviewed the PSPM program and its evaluation is documented in Section 3.0.3.3.5 of this audit and review report. The PSPM program description states that for station blackout diesel generator system, PNPS visually inspects station blackout jacket water radiators to manage loss of material and fouling. . On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since these components will be periodically inspected, the aging effect of fouling of aluminum heat exchanger fins and loss of material of radiator tubes exposed to an external environment of air-indoor and air-outdoor are effectively managed using the PSPM program.

In Table 3.3.2-5, the applicant proposed to manage loss of material of carbon steel, stainless steel, copper alloys < and > 15%Zn for component types of filter housing, lubricator housing, motor housing, piping, strainer housing, tank, tubing and valve body exposed to an internal environment of treated air using PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM).

The project team reviewed the PSPM program and its evaluation is documented in Section 3.0.3.3.5 of this audit and review report. The PSPM program description states that visual or other NDE techniques are used to inspect a representative sample of station blackout diesel intake air, air start, and exhaust components to manage loss of material, cracking, and fouling. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since these components will be periodically inspected, the aging effect of loss of material of carbon steel, stainless steel, copper alloys < and > 15%Zn components exposed to an internal environment of treated air are effectively managed using the PSPM program.

In Table 3.3.2-5, the applicant proposed to manage cracking due to fatigue of stainless steel and carbon steel material for component types of turbocharger housing, piping, and silencer exposed to an internal environment of exhaust gas using PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM).

The project team reviewed the PSPM program and its evaluation is documented in Section 3.0.3.3.5 of this audit and review report. The PSPM program description states that visual or other NDE techniques are used to inspect a representative sample of station blackout diesel intake air, air start, and exhaust components to manage loss of material, cracking, and fouling. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since these components will be periodically inspected, the aging effect of cracking of carbon steel, stainless steel, copper alloys < and > 15%Zn components exposed to an internal environment of exhaust gas are effectively managed using the PSPM program.

In Table 3.3.2-5, the applicant proposed to manage cracking of stainless steel material for component types of strainers and tubing exposed to an internal environment of lube oil using PNPS AMP B.1.22, "Oil Analysis Program".

The project team reviewed the Oil Analysis Program and its evaluation is documented in Section 3.0.3.2.13 of this audit and review report. The oil analysis program description states that program maintains oil systems free of contaminants (primarily water and particulates) thereby preserving an environment that is not conducive to loss of material, cracking, or fouling. Sampling frequencies are based on vendor recommendations, accessibility during plant operation, equipment importance to plant operation, and previous test results. The applicant depends on operating experience at PNPS to verify the effectiveness of the Oil Analysis Program. The project team asked the applicant how it can make this statement if inspection has not been performed. The applicant's response and its evaluation is documented in section 3.3.2.1.17 of this audit and review report.

3.3.2.3.6 Security Diesel Generator System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-6

The project team reviewed the PNPS LRA Table 3.3.2-6, which summarizes the results of AMR evaluations for the security diesel generator system component groups.

In Table 3.3.2-6, the applicant proposed to manage fouling of copper alloy >15% Zn and carbon steel material for component types of heat exchanger radiator and tubes exposed to an external environment of air-indoor using PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM).

The project team reviewed the PSPM program and its evaluation is documented in Section 3.0.3.3.5 of this audit and review report. The PSPM program description states that for security diesel generator system, PNPS performs security diesel generator surveillance test (loaded) to manage fouling for heat exchanger tubes. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since these components will be periodically tested, the aging effect of fouling of copper alloy >15% Zn and carbon steel heat exchanger radiator and tubes exposed to an external environment of indoor-air are effectively managed using the PSPM program.

In Table 3.3.2-6, the applicant proposed to manage loss of material for carbon steel and copper alloy > 15%Zn heat exchanger radiator and tubes exposed to an external environment of air-indoor using PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM).

The project team reviewed the PSPM program and its evaluation is documented in Section 3.0.3.3.5 of this audit and review report. The PSPM program description states that for security diesel generator system, PNPS visually inspects security diesel jacket water radiators to manage loss of material and fouling. . On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since these components will be periodically inspected, the aging effect of loss of material of heat exchanger radiator and tubes exposed to an external environment of air-indoor and air-outdoor are effectively managed using the PSPM program.

In Table 3.3.2-6, the applicant proposed to manage loss of material of carbon steel material for component types of heat exchanger tubes exposed to an external environment of lube oil using PNPS AMP B.1.22, "Oil Analysis Program".

The project team reviewed the Oil Analysis Program and its evaluation is documented in Section 3.0.3.2.13 of this audit and review report. The oil analysis program description states that program maintains oil systems free of contaminants (primarily water and particulates) thereby preserving an environment that is not conducive to loss of material, cracking, or fouling. Sampling frequencies are based on vendor recommendations, accessibility during plant operation, equipment importance to plant operation, and previous test results. The applicant depends on operating experience at PNPS to verify the effectiveness of the Oil Analysis Program. The project team asked the applicant how it can make this statement if inspection has not been performed. The applicant's response and its evaluation is documented in section 3.3.2.1.17 of this audit and review report.

In Table 3.3.2-6, the applicant proposed to manage cracking due to fatigue of carbon steel and gray cast iron material for component types of turbocharger housing, piping, and silencer exposed to an internal environment of exhaust gas PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM).

The project team reviewed the PSPM program and its evaluation is documented in Section 3.0.3.3.5 of this audit and review report. The PSPM program description states that visual or other NDE techniques are used to inspect a representative sample of station blackout diesel intake air, air start, and exhaust components to manage loss of material, cracking, and fouling. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since these components will be periodically inspected, the aging effect of

cracking of carbon steel and gray cast iron components exposed to an internal environment of exhaust gas are effectively managed using the PSPM program.

3.3.2.3.7 Fuel Oil System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-7

The project team reviewed PNPS LRA Table 3.3.2-7, which summarizes the results of AMR evaluations for the fuel oil system component groups. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.8 Instrument Air System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-8

The project team reviewed PNPS LRA Table 3.3.2-8, which summarizes the results of AMR evaluations for the instrument air system component groups. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.9 Fire Protection - Water System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-9

The project team reviewed PNPS LRA Table 3.3.2-9, which summarizes the results of AMR evaluations for the fire protection - water system component groups.

In Table 3.3.2-9, the applicant proposed to manage loss of material and fouling of gray cast iron and copper alloy >15% Zn material for component types of heat exchanger shell and tubes; and piping, pump casing and tanks exposed to an internal environment of treated water using PNPS AMP B.1.13.1, "Fire Protection Program".

The project team reviewed the Fire Protection Program and its review is documented in section 3.0.3.2.10 of this audit and review report. However, the fire protection program description does not include these components nor has the program been enhanced to include these components. The applicant was asked to clarify how the Fire Protection Program will manage these aging effects for these components. In its response, the applicant stated that as identified in LRA Appendix b.1.13.1, procedures will be enhanced to verify that diesel engine does not exhibit signs of degradation while running. Included in scope of this test are components that have an environment of lube oil, fuel oil, treated water and exhaust gas. Through monitoring and trending of performance data, specifically jacket cooling water, fouling and loss of material for the fire pump diesel jacket water heat exchanger will be identified and corrected through the corrective action program. On the basis that the applicant has appropriately identified these components in the program write-up, the project team found the response to be acceptable.

In Table 3.3.2-9, the applicant proposed to manage cracking due to fatigue of carbon steel material for component types of piping, silencer and turbocharger exposed to an internal environment of exhaust gas using PNPS AMP B.1.13.1, "Fire Protection Program."

The project team reviewed the Fire Protection Program and its review is documented in section 3.0.3.2.10 of this audit and review report. The program element 6, Acceptance Criteria, is enhanced to verify that the diesel engine did not exhibit signs of degradation while it was running; such as exhaust gas leakage. The project team did not consider verifying for leakage is

an adequate aging management program for managing cracking. If there is leakage, it implies a through-wall crack has occurred. The applicant was asked to justify how the aging effect of cracking is managed by verifying for exhaust gas leakage. The applicant's response and its evaluation is documented in section 3.3.2.2.7.3 of this audit and review report.

In Table 3.3.2.9, the applicant proposed to manage loss of material of carbon steel, gray cast iron, stainless steel, copper alloy >15% Zn and copper alloy <15% Zn material for component types of hydrants, nozzle, orifice, piping, pump casing, strainer, strainer housing, tank, tubing and valve body exposed to an internal environment of treated water using PNPS AMP B.1.13.2, "Fire Water System Program."

The project team reviewed the Fire Water System Program and its review is documented in section 3.0.3.2.11 of this audit and review report. This program is consistent with GALL Report AMP XI.M27, Fire Water System, with enhancements and exception. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since these components will be periodically inspected and tested, the aging effect of loss of material of carbon steel, gray cast iron, stainless steel, copper alloy >15% Zn and copper alloy <15% Zn components exposed to an internal environment of treated water are effectively managed using the Fire Water System Program.

In Table 3.3.2-9, the applicant proposed to manage cracking of stainless steel material for component types of strainer exposed to an external environment of lube oil using PNPS AMP B.1.22, "Oil Analysis Program".

The project team reviewed the Oil Analysis Program and its evaluation is documented in Section 3.0.3.2.13 of this audit and review report. The oil analysis program description states that program maintains oil systems free of contaminants (primarily water and particulates) thereby preserving an environment that is not conducive to loss of material, cracking, or fouling. Sampling frequencies are based on vendor recommendations, accessibility during plant operation, equipment importance to plant operation, and previous test results. The applicant depends on operating experience at PNPS to verify the effectiveness of the Oil Analysis Program. The project team asked the applicant how it can make this statement if inspection has not been performed. The applicant's response and its evaluation is documented in section 3.3.2.1.17 of this audit and review report.

In Table 3.3.2-9, the applicant proposed to manage loss of material of stainless steel material for component types of bolts exposed to an external environment of air outdoor using PNPS AMP B.1.30, "System Walkdown Program".

The project team reviewed the System Walkdown Program and its evaluation is documented in Section 3.0.3.1.11 of this audit and review report. The system walkdown program description states that this program entails inspection of external surfaces of components subject to aging management review. This program is consistent with the GALL Report AMP XI.M36, "External Surfaces Monitoring Program". On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that the aging effect of loss of material of stainless steel bolting exposed to an external environment of air-outdoor are effectively managed using the System Walkdown Program .

3.3.2.10 Fire Protection - Halon System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-10

The project team reviewed PNPS LRA Table 3.3.2-10, which summarizes the results of AMR evaluations for the fire protection - water system component groups. The results of these evaluations are all consistent with the GALL Report.

3.3.2.11 Heating, Ventilation and Air Conditioning System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-11

The project team reviewed PNPS LRA Table 3.3.2-11, which summarizes the results of AMR evaluations for the heating, ventilation and air conditioning system component groups.

In Table 3.3.2-11, the applicant proposed to manage fouling of copper alloy >15% Zn material for component types of heat exchanger tubes exposed to an external environment of condensation PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM).

The project team reviewed the PSPM program and its evaluation is documented in Section 3.0.3.3.5 of this audit and review report. The PSPM program description states that visual or other NDE techniques are used to inspect the air side of copper alloy tubes of heat exchangers to manage loss of material, and fouling. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since these components will be periodically inspected, the aging effect of fouling of copper aloy >15% Zn components exposed to an external environment of condensation are effectively managed using the PSPM program.

3.3.2.12 Primary Containment Atmosphere Control System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-12

The project team reviewed PNPS LRA Table 3.3.2-12, which summarizes the results of AMR evaluations for the primary containment atmosphere control system component groups. The results of these evaluations are all consistent with the GALL Report.

3.3.2.13 Fuel Pool Cooling and Fuel Handling and Storage System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-13

The project team reviewed PNPS LRA Table 3.3.2-13, which summarizes the results of AMR evaluations for the fuel pool cooling and fuel handing and storage system component groups.

In Table 3.3.2-13, the applicant proposed to manage cracking of aluminum/boron carbide material for component types of neutron absorber (boral) exposed to an external environment of treated water using PNPS AMP B.1.32.2, "Water Chemistry Control - BWR Program."

The project team reviewed the Water Chemistry Control - BWR Program and its evaluation is documented in Section 3.0.3.1.13 of this audit and review report. This program is consistent with the GALL Report AMP XI.M2, "Water Chemistry." On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since the water chemistry will be periodically monitored and controlled within established levels of contaminants, the aging effect of cracking of aluminum/boron carbide neutron absorber (boral) components exposed to an external environment of treated water is effectively managed using the Water Chemistry Control - BWR Program .However, for those line items in Table 3.3.2-13, where the

Water Chemistry Control - BWR Program is credited, the applicant did not indicate how it proposes to verify the effectiveness of the water chemistry program. The project team asked the applicant to justify why a verification program was not credited. The applicant's response and its evaluation is documented in section 3.3.2.2.3.2 of this audit and review report.

3.3.2.3.14 Compressed Air System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-2

The project team reviewed PNPS LRA Table 3.3.2-14-2, which summarizes the results of AMR evaluations for the compressed air system non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.15 Control Rod Drive System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-6

The project team reviewed PNPS LRA Table 3.3.2-14-6, which summarizes the results of AMR evaluations for the control rod drive system non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.16 Emergency Diesel Generator System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-8

The project team reviewed PNPS LRA Table 3.3.2-14-8, which summarizes the results of AMR evaluations for the emergency diesel generator system non-safety related component groups affecting safety-related systems.

In Table 3.3.2-14-8, the applicant proposed to manage cracking and loss of material of stainless steel material for component types of piping and valve body exposed to an internal environment of untreated air using PNPS AMP B.1.23, "One-Time Inspection Program."

The project team reviewed the One-Time Inspection program and its evaluation is documented in Section 3.0.3.1.8 of this audit and review report. The One-Time Inspection Program is a new program, which when implemented will be consistent with the GALL Report AMP XI.M32, One-Time Inspection. The program description states that for internal surfaces of and emergency diesel generator system components containing untreated air, one-time inspection activity will confirm that cracking and loss of material are not occurring or are so insignificant that an aging management program is not warranted. Normally a one-time inspection by itself may not be adequate for managing aging effects. However, stainless steel in an untreated air environment may exhibit an insignificant loss of material due to the moisture present in the air and the one-time inspection would confirm if any aging is occurring. Similarly, for cracking to occur in stainless steel, a corrosive atmosphere in the presence of moisture needs to occur and a temperature >140°F needs to be present. Neither of these conditions are present in untreated air environment, but the applicant has conservatively assumed that cracking could occur. Again, a one-time inspection would confirm if there is any cracking. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since these components will be inspected one-time prior to the period of extended operation to confirm if any aging as occurred, the aging effect of cracking and loss of material of stainless steel components exposed to an internal environment of untreated air are effectively managed using the One-Time Inspection program.

3.3.2.3.17 Fire Protection System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-12

The project team reviewed PNPS LRA Table 3.3.2-14-12, which summarizes the results of AMR evaluations for the fire protection system non-safety related component groups affecting safety-related systems.

In Table 3.3.2-14-12, the applicant proposed to manage loss of material of stainless steel, carbon steel, gray cast iron, copper alloy >15% Zn and copper alloy <15% Zn material for component types of nozzle, orifice, piping, tubing and valve body exposed to an internal environment of treated water using PNPS AMP B.1.13.2, "Fire Water System Program."

The project team reviewed the Fire Water System Program and its review is documented in section 3.0.3.2.11 of this audit and review report. This program is consistent with GALL Report AMP XI.M27, Fire Water System, with enhancements and exception. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since these components will be periodically inspected and tested, the aging effect of loss of material of carbon steel, gray cast iron, stainless steel, copper alloy >15% Zn and copper alloy <15% Zn components exposed to an internal environment of treated water are effectively managed using the Fire Water System Program.

3.3.2.3.18 Fuel Oil Storage and Transfer System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-13

The project team reviewed PNPS LRA Table 3.3.2-14-13, which summarizes the results of AMR evaluations for the fuel oil storage and transfer system non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.19 Fuel Pool Cooling and Demineralizer System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-14

The project team reviewed PNPS LRA Table 3.3.2-14-14, which summarizes the results of AMR evaluations for the fuel pool cooling and demineralizer system non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.20 Heating, Ventilation and Air Conditioning System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-15

The project team reviewed PNPS LRA Table 3.3.2-14-15, which summarizes the results of AMR evaluations for the heating, ventilation and air conditioning system non-safety related component groups affecting safety-related systems.

In Table 3.3.2-11, the applicant proposed to manage cracking and change in material properties of elastomer material for component types of expansion joints exposed to an internal environment of treated water using PNPS AMP B.1.24, "Periodic Surveillance and Preventive Maintenance Program" (PSPM).

The project team reviewed the PSPM program and its evaluation is documented in Section

3.0.3.3.5 of this audit and review report. The PSPM program description states that fan duct flexible connections in heating, ventilation and air conditioning systems are visually inspected and manually flexed to manage cracking and change in material properties. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since these components will be periodically inspected and manually flexed, the aging effect of cracking and change in material properties of elastomer components exposed to an internal environment of treated water are effectively managed using the PSPM program.

3.3.2.3.21 Offgas and Augmented Offgas System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-19

The project team reviewed PNPS LRA Table 3.3.2-14-19, which summarizes the results of AMR evaluations for the offgas and augmented offgas system non-safety related component groups affecting safety-related systems.

In Table 3.3.2-19, the applicant proposed to manage cracking due to fatigue of stainless steel material for component types of thermowells, tubing and valve body exposed to an internal environment of steam > 270°F using metal fatigue TLAA. The evaluation of metal fatigue is documented in section 4.3.2 of this audit and review report.

3.3.2.3.22 Post-Accident Sampling System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-20

The project team reviewed PNPS LRA Table 3.3.2-14-20, which summarizes the results of AMR evaluations for the post-accident sampling system non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.23 Potable and Sanitary Water System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-21

The project team reviewed PNPS LRA Table 3.3.2-14-21, which summarizes the results of AMR evaluations for the potable and sanitary water system non-safety related component groups affecting safety-related systems.

In Table 3.3.2-21, the applicant proposed to manage loss of material of carbon steel, stainless steel, copper alloy >15% Zn and copper alloy <15% Zn material for component types of orifice, piping, pump casing, strainer housing, tubing and valve body exposed to an internal environment of treated water using PNPS AMP B.1.32.1, "Water Chemistry Control - Auxiliary Systems Program."

The project team reviewed the Water Chemistry Control - Auxiliary Systems program and its evaluation is documented in Section 3.0.3.3.6 of this audit and review report. The program monitors conductivity, corrosion products and dissolved oxygen in accordance with industry recommendation. On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that since the water chemistry will be periodically monitored and controlled within established levels of contaminants, the aging effect of loss of material of carbon steel, stainless steel, copper alloy >15% Zn and copper alloy <15% Zn material for component types of orifice, piping, pump casing, strainer housing, tubing and valve

body exposed to an internal environment of treated water is effectively managed using the Water Chemistry Control - Auxiliary Systems Program .

3.3.2.3.24 Primary Containment Atmospheric Control System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-22

The project team reviewed PNPS LRA Table 3.3.2-14-22, which summarizes the results of AMR evaluations for the primary containment atmospheric control system non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.25 Radioactive Waste System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-23

The project team reviewed PNPS LRA Table 3.3.2-14-23, which summarizes the results of AMR evaluations for the radioactive waste system non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.26 Reactor Building Closed Cooling Water System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-24

The project team reviewed PNPS LRA Table 3.3.2-14-24, which summarizes the results of AMR evaluations for the reactor building closed cooling water system non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.27 Reactor Coolant System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-26

The project team reviewed PNPS LRA Table 3.3.2-14-26, which summarizes the results of AMR evaluations for the reactor coolant system non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.28 Reactor Water Cleanup System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-27

The project team reviewed PNPS LRA Table 3.3.2-14-27, which summarizes the results of AMR evaluations for the reactor water cleanup non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.29 Salt Service Water System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-29

The project team reviewed PNPS LRA Table 3.3.2-14-29, which summarizes the results of AMR evaluations for the salt service water non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.30 Sampling System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-30

The project team reviewed PNPS LRA Table 3.3.2-14-30, which summarizes the results of AMR evaluations for the sampling non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.31 Sanitary Soiled Waste and Vent; Plumbing and Drains System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-31

The project team reviewed PNPS LRA Table 3.3.2-14-31, which summarizes the results of AMR evaluations for the sanitary soiled waste and vent; plumbing and drains non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.32 Screen Wash System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-32

The project team reviewed PNPS LRA Table 3.3.2-14-32, which summarizes the results of AMR evaluations for the screen wash non-safety related component groups affecting safety-related systems.

In Table 3.3.2-32, the applicant proposed to manage loss of material of nickel alloy material for component types of piping exposed to an external environment of condensation using PNPS AMP B.1.30, "System Walkdown Program".

The project team reviewed the System Walkdown Program and its evaluation is documented in Section 3.0.3.1.11 of this audit and review report. The system walkdown program description states that this program entails inspection of external surfaces of components subject to aging management review. This program is consistent with the GALL Report AMP XI.M36, "External Surfaces Monitoring Program". On the basis of its review of the applicant's plant-specific and industry operating experience, the project team found that the aging effect of loss of material of nickel alloy piping exposed to an external environment of condensation is effectively managed using the System Walkdown Program .

3.3.2.3.33 Standby Liquid Control System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-33

The project team reviewed PNPS LRA Table 3.3.2-14-33, which summarizes the results of AMR evaluations for the standby liquid control non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

3.3.2.3.34 Turbine Building Closed Cooling Water System - Summary of Aging Management Evaluation - PNPS LRA Table 3.3.2-14-34

The project team reviewed PNPS LRA Table 3.3.2-14-34, which summarizes the results of AMR evaluations for the turbine building closed cooling water non-safety related component groups affecting safety-related systems. The results of these evaluations are all consistent with the GALL Report.

Conclusion

On the basis of its review, the project team found that the applicant appropriately evaluated AMR results involving material, environment, aging effects requiring management, and AMP combinations that are not addressed in the GALL Report. The project team found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.3 Conclusion

On the basis of its review, the project team concluded that the applicant has demonstrated that the aging effects associated with the auxiliary systems components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The project team also reviewed the applicable UFSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the auxiliary systems components, as required by 10 CFR 54.21(d).