

April 7, 2010

Mr. Randall K. Edington
Executive Vice President, Nuclear
Mail Station 7602
Arizona Public Service Company
P.O. Box 52034
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SUBJECT: AUDIT REPORT REGARDING THE PALO VERDE NUCLEAR GENERATING
STATION, UNITS 1, 2, AND 3, LICENSE RENEWAL APPLICATION (TAC NOS.
ME0254, ME0255, ME0256)

Dear Mr. Edington:

By letter dated December 11, 2008, as supplemented by letter dated April 14, 2009, Arizona Public Service Company submitted an application for renewal of operating licenses NPF-41, NPF-51, and NPF-74 for the Palo Verde Nuclear Generating Station, Units 1, 2, and 3, respectively. On December 11, 2009, the U.S. Nuclear Regulatory Commission (NRC) audit team completed the on-site audit of aging management programs in accordance with the regulatory audit plan of November 18, 2009. The audit report is enclosed.

If you have any questions, please contact Ms. Lisa Regner at 301-415-1906 or by e-mail at Lisa.Regner@nrc.gov.

Sincerely,

/RA by Jeremy Susco for/

Lisa M. Regner, Sr. Project Manager
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-528, 50-529, and 50-530

Enclosure:
As stated

cc w/encl: See next page

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Executive Vice President, Nuclear
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If you have any questions, please contact Ms. Lisa Regner at 301-415-1906 or by e-mail at Lisa.Regner@nrc.gov.

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Lisa M. Regner, Sr. Project Manager
Projects Branch 2
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Palo Verde Nuclear Generating Station

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U.S. NUCLEAR REGULATORY COMMISSION

**OFFICE OF NUCLEAR REACTOR REGULATION - DIVISION OF LICENSE RENEWAL
AGING MANAGEMENT AUDIT REPORT**

Docket Nos: 50-528, 50-529, 50-530

License Nos: NPF-41, NPF-51, NPF-74

Licensee: Arizona Public Service Corporation

Facility: Palo Verde Nuclear Generating Station, Units 1, 2, and 3

Location: Palo Verde Nuclear Generating Station
5801 S. Wintersburg Road
Tonopah, Arizona 85354

Dates: December 7-11, 2009

Reviewers: L. Regner, Sr. Project Manager, Division of License Renewal (DLR)
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David J. Wrona, Chief
Projects Branch 2
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Introduction

An on-site audit was conducted by the U.S. Nuclear Regulatory Commission (NRC) project team at the Palo Verde Nuclear Generating Station, Units 1, 2, and 3 (PVNGS) on December 7-11, 2009. The purpose of this audit was to examine the applicant's aging management programs (AMPs) and to verify the applicant's claim of consistency with the corresponding NUREG-1801, "Generic Aging Lessons Learned (GALL) Report" AMPs. Exceptions to the GALL Report AMP elements will be evaluated separately as part of the NRC staff's review of the license renewal application (LRA) and will be documented in the staff's Safety Evaluation Report (SER).

The "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR), NUREG-1800, Revision 1, provides the staff guidance for reviewing LRA. The SRP-LR allows an applicant to reference in its LRA the AMPs described in the GALL Report. The applicant concludes that its AMPs correspond to those AMPs referenced in the GALL Report; therefore, no further staff review is required. If an applicant credits an AMP for being consistent with a GALL Report program, it is incumbent on the applicant to ensure that the plant program contains all of the elements of the referenced GALL Report program. The applicant's determination should be documented in an auditable form and maintained on-site.

During this audit, the staff reviewed program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria), and program element 10 (operating experience), of the applicant's AMPs claimed to be consistent with the GALL Report. These were compared to the equivalent elements of the associated AMP described in the GALL Report, unless otherwise indicated in this Audit Report. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) were audited by another NRC project team during the Scoping and Screening Methodology audit conducted from October 19 to 23, 2009, and are evaluated separately. In addition, the staff verified the conditions at the plant were bounded by the conditions for which the GALL Report program was evaluated.

The staff also examined the applicant's program bases documents and related references for these AMPs and interviewed Palo Verde representatives to obtain additional clarification.

A request for additional information associated with this audit was issued on December 29, 2009.

LRA AMP B2.1.1, ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD

In the PVNGS LRA, the applicant states that AMP B2.1.1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD” is an existing program that is consistent with the program elements in GALL Report AMP XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD.” To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the updated final safety analysis (UFSAR) Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant’s operating experience database using the keywords: “Class 1,” “weld,” “examination,” “ISI,” “inspection,” “indication,” “crack,” “flaw,” and “internal.”

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.1-Rev.1	PVNGS Aging Management Program Evaluation Report, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD”	Revision 1 12/05/2008
2. 73DP-9XI03	Nuclear Administrative and Technical Manual, “ASME Section XI Inservice Inspection”	Revision 7
3. 73DP-9EE02	Nuclear Administrative and Technical Manual, “Inservice Inspection Examination Activities”	Revision 8
4. 73DP-9ZZ17	Nuclear Administrative and Technical Manual, “Repair and Replacement – ASME Section XI”	Revision 16
5. 73DP-9XI04	Nuclear Administrative and Technical Manual, Inservice Inspection Program – “System Pressure Testing Administrative Requirements”	Revision 3
6. N/A	PVNS License Renewal Component List for AMP – XI.M1, “ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD,” B2.1.1	Database Printout, Undated
7. 3INT-ISI-1	3 rd Inspection Interval, Inservice Inspection Program Summary Manual, PVNGS Unit 1	Revision 0 7/7/2009
8. 3INT-ISI-2	3 rd Inspection Interval, Inservice Inspection Program Summary Manual, PVNGS Unit 2	Revision 1 10/1/2009
9. 3INT-ISI-3	3 rd Inspection Interval, Inservice Inspection Program Summary Manual, PVNGS Unit 3	Revision 0 3/19/2009
10. CRDR 91491	ASME Section XI Additional Exams When Degraded Conditions Are Identified	6/2/1998

During the audit of program elements 1-6, the staff found that:

elements 1, 2, 3, 4, 5, and 6 (scope of program, preventive actions, parameters monitored/inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;

in its review of the applicant's Inservice Inspection (ISI) Program Manuals (references 7, 8, and 9), the staff noted that the applicant's current, third-interval ASME Section XI, Subsections IWB, IWC, and IWD program does not use risk-informed ISI methodology and that at this time there has been no relief request associated with use of risk-informed ISI. The staff also noted that the applicant's program appropriately includes the requirements in 10 CFR 50.55a that code cases N-722 and N-729-1 be utilized to provide: a) additional examinations for PWR pressure retaining welds in Class 1 components fabricated with Alloy 600/82/182 materials, and b) alternative examination requirements for pressure-water reactor (PWR) reactor vessel upper heads with nozzles having pressure-retaining partial-penetration welds, respectively. The staff also confirmed that all components for which examination is specified in ASME Code Section XI have been examined in each preceding ten-year ISI interval.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e. no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.2, Water Chemistry

In the PVNGS LRA, the applicant states that AMP B2.1.2, "Water Chemistry" is an existing program with an enhancement that is consistent with the program elements in GALL Report AMP XI.M2, "Water Chemistry." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The enhancement affects LRA program elements 1 and 2 (scope of program and preventive actions). This enhancement expands on the existing program elements with additional plant procedures for sampling of effluents from a new secondary system cation resin for purgeable and non-purgeable organic carbon.

In Table A4-1 of the LRA, the applicant committed to implement this enhancement prior to the period of extended operation.

During its audit, the staff conducted a service water system and water chemistry walkdown, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "chemistry," "corrosion," "pH," "reactor coolant," "dissolved oxygen," and "cracking."

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B.2.1.2-Rev 2	PVNGS Aging Management Program Evaluation Report: Water Chemistry – B2.1.2	Revision 2 3/6/2009
2. 74DP-9CY03	Chemistry Control Instructions	Revision 5 9/12/2007
3. 74DP-9CY04	System Chemistry Specifications	Revision 60 1/16/2009
4. 74DP-9ZZ05	Abnormal Occurrence Checklist	Revision 26
5. CRDR 2754777	Condensation Demineralizer Influent Impurities Were Extremely High While the Secondary System was in the Long-Path Recirc During Recovery From 3R11	7/26/2007
6. CRDR 3042937	S/G Sodium Entered Action Level 1 Due to A Hotwell Leak in the 1A Hotwell.	11/24/2009

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

elements 3, 4, and 6 (parameters monitored or inspected, detection of aging effects, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;

elements 1 and 2 (scope of program and preventive actions) of the LRA AMP were not strictly consistent with the corresponding elements of the GALL Report AMP but that sufficient information was available to allow the staff to determine that these elements of the LRA AMP are equivalent to the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether element 5 (monitoring and trending) of the LRA AMP was consistent with the corresponding elements of the GALL Report AMP.

The basis for the staff's determination that elements 1 and 2 (scope of program and preventive actions) of the LRA AMP are equivalent to the corresponding GALL Report AMP is:

The applicant's technical basis documents indicated that the Water Chemistry Program could be used to monitor hardening and loss of strength, which is not consistent with the GALL Report. After a discussion with the applicant, it was indicated that these were incorrect and would be modified in the applicant's technical documentation. Secondly, the applicant's license renewal application does contain a line item for hardening and loss of strength that is being managed by the Water Chemistry Program.

The applicant's technical basis document indicated that the Water Chemistry Program would be used to detect degradation. This is not consistent with the GALL Report, which indicated that the Water Chemistry Program should be used for mitigation purposes. After a discussion with the applicant, it was indicated that this was incorrect and would be modified in the applicant's technical documentation.

In order to obtain the information necessary to verify whether the LRA program element number 5 is consistent with the corresponding elements of the GALL Report AMP, the staff issued RAI B2.1.2-1 for the following subject:

Element 5 of the LRA AMP states that the Water Chemistry Program increases the sampling frequency when a monitoring instrument is out of service. In the GALL Report AMP it states that whenever corrective actions are taken to address an abnormal chemistry condition, increased sampling is utilized to verify that the effectiveness of these actions. It is not clear to the staff that these statements are consistent because the applicant's statement is discussing failure of monitoring instruments, while the GALL Report is discussing abnormal chemistry conditions.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff);

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement in LRA Section A1.2. The staff found this description to be consistent with the description provided in the SRP-LR and therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.3, Reactor Head Closure Studs

In the PVNGS LRA, the applicant states that AMP B2.1.3, "Reactor Head Closure Studs" is an existing program that is consistent with the program elements in GALL Report AMP XI.M3, "Reactor Head Closure Studs." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (Corrective Actions, Confirmation Process, and Administrative Controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "head stud," "head bolt," "examination," "closure studs," "loss of preload," "thread lubricant," "galling," and "tensioner."

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.3-Rev.1	PVNGS Aging Management Program Evaluation Report, "Reactor Head Closure Studs"	Revision 1 01/02/2009
2. 73DP-9XI03	Nuclear Administrative and Technical Manual, "ASME Section XI Inservice Inspection"	Revision 7
3. 73DP-9EE02	Nuclear Administrative and Technical Manual, "Inservice Inspection Examination Activities"	Revision 8
4. 73DP-9ZZ17	Nuclear Administrative and Technical Manual, "Repair and Replacement – ASME Section XI"	Revision 16
5. 31MT-9RC30	Nuclear Administrative and Technical Manual, Inservice Inspection Program – "Reactor Vessel Head Removal and Installation"	Revision 37
6. 73TI-9ZZ22	Nuclear Administrative and Technical Manual, Inservice Inspection Program – "Visual Examination for Leakage – Interval 3"	Revision 1
7. 73TI-9ZZ14	Nuclear Administrative and Technical Manual, Inservice Inspection Program – "Ultrasonic Examination of Bolting"	Revision 11
8. 73TI-9ZZ16	Nuclear Administrative and Technical Manual, Inservice Inspection Program – "Ultrasonic Examination of Threaded Areas in Flange(s)"	Revision 7
9. 31MT-9RC32	Nuclear Administrative and Technical Manual, Inservice Inspection Program – "Reactor Vessel Stud Cleaning and Inspection"	Revision 7
10. N/A	PVNS License Renewal Component List for AMP – XI.M3, "Reactor Head Closure Studs," B2.1.3	Database Printout, Undated
11. N/A	Material Safety Data Sheet for Lubriko L1G6M5	Revision Date 9/20/2007
12. CRDR 2896810	Review of Issue Report Regarding Potential Problem with the Reactor Head Lift Rig	5/19/2006

During the audit of program elements 1–6, the staff found that:

elements 1, 3, 5, and 6 (scope of program, parameters monitored/inspected, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;

sufficient information was not available to determine whether elements 2 and 4 (preventive actions and detection of aging effects) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element numbers 2 and 4 are consistent with the corresponding elements of the GALL Report AMP, the staff issued RAIs B2.1.7-03 and B2.1.3-01 for the following subjects:

In its review of element 2 of the LRA AMP, the staff found that the applicant uses Lubrikol L1G6M5, which contains 1 percent molybdenum disulfide, as a thread lubricant on the reactor head bolt closure studs. In the GALL Report, AMP element 2 states that preventive measures include use of acceptable surface treatments and stable lubricants and that implementation of this measure can reduce potential for stress-corrosion cracking or intergranular stress-corrosion cracking. The staff noted that NUREG-1339, "Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants," includes specific recommendations against use of thread lubricants containing molybdenum disulfide. Therefore, it is not clear to the staff that the applicant's use of Lubrikol L1G6M5 is consistent with the GALL Report's recommendation to use acceptable surface treatments and stable lubricants.

In its review of element 4 of the LRA AMP the staff found that the applicant performs volumetric (not volumetric and surface) examination of reactor head closure studs when they are removed from the reactor vessel flange. In the GALL Report, AMP element 4 states that Examination Category B-G-1 for pressure-retaining bolting greater than 2 inches diameter in the reactor vessel, specifies surface and volumetric examination of studs when they are removed from the reactor vessel. It is not clear to the staff that these statements are consistent because the applicant does not routinely perform surface examinations of reactor vessel head closure studs when they are removed from the vessel flange.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e. no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.4, Boric Acid Corrosion

In the PVNGS LRA, the applicant states that AMP 2.1.4, “Boric Acid Corrosion” is an existing program that is consistent with the program elements in GALL Report AMP XI.M10, “Boric Acid Corrosion.” To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant’s operating experience database using the keywords: “boric acid,” “rust,” “loss of material,” “degradation,” “corrosion,” and “weld.”

The table below lists documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. 73DP-9ZC01	Boric Acid Corrosion Control Program	Revision 1 6/18/2008
2. 70TI-9ZC01	Boric Acid Walkdown Leak Detection	Revision 7 6/18/2008
3. 73TI-9ZZ78	Visual Examination for Leakage – Interval 3	Revision 9 8/6/2008
4. 73TI-9RC09	Bare Metal Visual Examination or Reactor Vessel Upper Head	
5. 73TI-9RC10	Bare Metal Visual Examination or Reactor Vessel Bottom Head	
6. 81DP-0AP02	PVNGS Coatings Program	Revision 2 5/7/2004
7. 3INT-INCO-06	Alloy 600 Management Program	
8. 01DP-0AP12	Palo Verde Action Request Processing	
9. 01PR-0AP04	Correction Action Program	
10. 01DP-0AP12	Palo Verde Action Request Processing	Revision 12
11. 73TD-0ZZ03	System Engineering Handbook	Revision 11 11/5/2009
12.XI.10 Aging Management CRDR OE Report	PVNGS License Renewal Aging Management CRDR Operating Experience Report for AMP XI.M10, "Boric Acid Corrosion" B2.1.4	No rev. No. Not dated

During the audit of program elements 1-6, the staff found that:

elements 1, 2, 3, 4, 5, and 6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement A1.4 of the PVNGS LRA. The staff found this description to be consistent with the description provided in the SRP-LR and therefore, acceptable.

Based on this audit the staff:

verified that LRA program elements 1–6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging, and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.7, Bolting Integrity

In the PVNGS LRA, the applicant states that AMP B2.1.7, "Bolting Integrity" is an existing program with exceptions that is consistent with the program elements in GALL Report AMP XI.M18, "Bolting Integrity." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the FSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first exception affects LRA program element 1 (scope of program). In the GALL Report AMP, this program element states that the staff's recommendations and guidelines for comprehensive bolting integrity programs that encompass all safety-related bolting are delineated in NUREG 1339, which includes the criteria established in the 1995 edition through the 1996 addenda of ASME Code Section XI. Alternatively, this program element in the LRA AMP states, that the applicant's third interval ISI Program is currently using ASME Code Section XI, 2001 edition with addenda 2002 and 2003. The applicant also stated that this is consistent with provisions in 10 CFR 50.55a to use the ASME Code in effect 12 months prior to the start of the inspection interval and that it will use the ASME Code Edition consistent with provisions of 10 CFR 50.55a during the period of extended operation.

The second exception affects LRA program element 3 (parameters monitored/inspected). In the GALL Report AMP, this program element recommends that bolting for safety-related pressure retaining components be inspected for leakage, loss of material, cracking, and loss of preload/loss of prestress and that bolting for other pressure retaining components be inspected for signs of leakage. Alternatively, this program element in the LRA AMP states, that discussion of bolt preload in EPRI NP-5769, Volume 2, Section 10, indicates that job inspection torque is non-conservative since for a given fastener tension more torque is required to restart the installed bolts and that inspection of preload is usually unnecessary if the installation method has been carefully followed. The applicant further stated that torque values are provided in procedures or by vendor instructions, design documents, or specifications, and that torque values provided in procedures are based on industrial experience that includes consideration of the expected relaxation of the fasteners over the life of the joint and gasket stress in the application for pressure closure bolting.

The third exception affects LRA program element 5 (monitoring and trending). In the GALL Report AMP, this program element recommends that if a bolting connection for pressure retaining components (not covered by ASME Section XI) is reported to be leaking, then it may be inspected daily, and if the leak rate does not increase, the inspection frequency may be decreased to biweekly or weekly. Alternatively, this program element in the LRA AMP states, that for pressure retaining components reported to be leaking, the corrective action program will be initiated and that the corrective actions, including adjustment of the inspection frequency for closer monitoring of the condition, if necessary, will be identified based on analysis of trending data to ensure there is not a loss of intended function. The applicant further stated that where it is deemed necessary, preventive maintenance activities, such as gasket replacement or bolting tightness checks, can be created.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "bolt," "nut," "preload," "torque," "leak," "thread," "fastener," "gasket," and "bolting integrity program."

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.7-Rev.1	PVNGS Aging Management Program Evaluation Report, "Bolting Integrity"	Revision 1 03/18/2009
2. 73DP-9XI03	Nuclear Administrative and Technical Manual, "ASME Section XI Inservice Inspection"	Revision 7
3. 73DP-9EE02	Nuclear Administrative and Technical Manual, "Inservice Inspection Examination Activities"	Revision 8
4. 73DP-9ZZ17	Nuclear Administrative and Technical Manual, "Repair and Replacement – ASME Section XI"	Revision 16
5. 73TI-9ZZ17	Nuclear Administrative and Technical Manual, Inservice Inspection Program – "Visual Examination of Welds, Bolting, and Components"	Revision 9
6. 73TI-9ZZ22	Nuclear Administrative and Technical Manual, Inservice Inspection Program – "Visual Examination for Leakage – Interval 3"	Revision 4 8/28/2008
7. 30DP-9MP02	Nuclear Administrative and Technical Manual, Inservice Inspection Program – "Fastener Tightening/Preload"	Revision 7
8. 73TI-9ZZ18	Nuclear Administrative and Technical Manual, Inservice Inspection Program – "Visual Examination of Component Supports"	Revision 11
9. N/A	PVNS License Renewal Component List for AMP – XI.M18, "Reactor Head Closure Studs," B2.1.7	Database Printout, Undated
10. DSG-ME-2.19	PVNGS Design Guide for Bolted Joints	Revision 0 12/27/1993
11. CRDR 3189156	Unit 3 Emergency Diesel Generator B Fuel Injection Pump Bolt Crack Like Indication	6/17/2008
12. CRDR 48810	Unit 2 Polar Crane Bridge Crane Rail Studs found broken Off During Preventive Maintenance	4/4/1993
13. CRDR 3193913	VT-2 Examinations Required due to Discovery of Corrosion Susceptible Bolting	12/1/2009
14. CRDR 78696	Bolt Torque Given in Fisher Instruction Manual for Actuators Provides Insufficient Fastener Preload	10/24/1995

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program. Aspects of program elements 1, 3, and 5 (scope of program, parameters monitored/inspected, and monitoring and trending) of the LRA AMP associated with the exceptions were not evaluated during this audit. Aspects of these program elements that are not associated with the exceptions were evaluated and are described below.

During the audit, the staff found that:

element 5 (acceptance criteria) of the LRA AMP was consistent with the corresponding elements of the GALL Report AMP in those aspect for which the applicant claimed consistency; and

sufficient information was not available to determine whether elements 1, 2, 3, 4, and 6 (scope of program, preventive actions, parameters monitored/inspected, detection of aging effects, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element numbers 1, 2, 3, 4 and 6 are consistent with the corresponding elements of the GALL Report AMP, the staff issued RAIs B2.1.7-01, B2.1.7-02, and B2.1.7-03 for the following subjects:

In elements 1, 3, 4, and 6 of the LRA AMP as described in the applicant's program evaluation report, there are no recommendations related to the aging management of structural bolting. The program evaluation report (Sections 5.1 and 5.7) also states that aging of structural bolting and containment pressure boundary bolting, which is safety related, is managed in AMPs different from the Bolting Integrity program. However, in the GALL Report AMP the description of elements 1, 3, 4, and 6 includes recommendations related to the aging management of structural bolting and all safety related bolting. Although the applicant did not identify an exception related to aging management of structural bolting, the staff believes that there is an exception related to these program elements because the applicant uses AMP(s) different from the Bolting Integrity program to provide aging management for structural bolting.

In element 2 of the LRA AMP, the applicant does not identify any exceptions to the program element as described in the GALL Report. In the GALL Report, element 2 of the AMP includes a statement that the use of thread lubricants is in accordance with the guidelines of EPRI NP-5769, and the additional recommendations of NUREG-1339, to prevent or mitigate degradation and failure of safety-related bolting. EPRI NP-5769 and NUREG-1339 include a specific recommendation that thread lubricants containing molybdenum disulfide not be used in safety related bolting applications. Based on information obtained in review of AMP XI.M3, "Reactor Head Closure Studs," indicating that the applicant uses a lubricant containing molybdenum disulfide on the reactor head closure studs, it is not clear to the staff whether the recommendation against use of lubricants containing molybdenum disulfide is included in the applicant's Bolting Integrity program.

In element 3 of the LRA AMP, the applicant states that its program includes an exception to GALL Report AMP program element 3. However, the applicant does not clearly describe what the exception to the GALL Report AMP is. The staff issued an RAI asking the applicant to provide a clear description of the exception to GALL program element 3 and to justify that the AMP, with the exception, provides adequate management of the aging effects for which it is credited during the period of extended operation.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff);

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.9, Open-Cycle Cooling Water System

In the PVNGS LRA, the applicant states that AMP B2.1.9, "Open-Cycle Cooling Water System" is an existing program with an enhancement that is consistent with the program elements in GALL Report AMP XI.M20, "Open-Cycle Cooling Water System." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement in LRA Section A1.9. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified in this report but not resolved are addressed in the SER.

The enhancement affects LRA program elements 4 and 6 (detection of aging effects and acceptance criteria). This enhancement expands on the existing program element by clarifying the guidance for nondestructive evaluation (NDE) techniques and related acceptance criteria with respect to piping inspections.

In Table A4-1 of the LRA, the applicant committed to implement this enhancement prior to period of extended operation.

During its audit, the staff conducted a service water system and water chemistry walkdown, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "chemistry," "corrosion," "biofouling," and "microbiological corrosion."

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.9	Open-Cycle Cooling Water System	Revision 4 12/4/2009
2. EPRI-TR-107397	Service Water Heat Exchanger Testing Guidelines	March 1998
3. 73DP-0ZZ04	Service Water Reliability Program	Revision 6 5/15/2009
4. 74DP-9CY04	System Chemistry Specifications	Revision 66 11/20/2009
5. 70DP-9SP01	Spray Pond Piping Integrity Verification	Revision 3 2/6/2008
6. 73DP-9ZZ11	Heat Exchanger Program	Revision 9
7. 73DP-9ZZ21	Heat Exchanger Visual Inspection	Revision 1 9/30/2009
8. DB_ID 3185416	Arizona Game & Fish and the USGS Verified that Quagga / Zebra Mussels are In the Arizona Water System and Will Eventually Make Their Way Out Here to Palo Verde Via the WRF Pipeline, is Palo Verde Preparing	6/5/2008
9. CRDR 2898120	During Surveillance Testing of the 2B Emergency Diesel Generator, High Intake Temperature Indicated Heavy Fouling of Intercooler Tubing	11/23/2009
10. CRDR 62123	CRDR Documents a Leak From the "SP" to the "EW" System Via the "EW-A" Heat Exchanger	11/26/2006

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

elements 1, 3, 5, and 6 (scope of program, parameters monitored or inspected, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;

element 4 (detection of aging effects) of the LRA AMP was not strictly consistent with the corresponding elements of the GALL Report AMP but that sufficient information was available to allow the staff to determine that this element of the LRA AMP is equivalent to the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether element 2 (preventive actions) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP.

The basis for the staff's determination that element 4 (detection of aging effects) of the LRA AMP is equivalent to the corresponding GALL Report AMP is:

In element 4 of the LRA AMP it states that the AMP will be enhanced to clarify piping inspections using NDE techniques and related acceptance criteria. In the GALL Report AMP it states that this program typically uses visual inspections; however, nondestructive testing, such as ultrasonic testing, eddy current testing, and heat transfer capability testing, are effective methods to measure surface condition and the extent of wall thinning associated with the service water system piping and components, when determined necessary. The applicant's enhancement to this program includes the use of nondestructive testing other than visual inspection. However, the applicant is already using visual inspection and plans to continue using visual inspection, which is consistent with the recommendations in the GALL Report.

In order to obtain the information necessary to verify whether the LRA program element number 2 is consistent with the corresponding element of the GALL Report AMP, the staff issued RAI B2.1.9-1 for the following subject:

In element 2 of the LRA AMP, it states that PVNGS does not take credit for coatings and linings to mitigate the effects of aging. In the GALL Report AMP, it states system components are constructed of appropriate materials and lined or coated to protect the underlying metal surfaces from being exposed to aggressive cooling water environments. It is not clear to the staff that these statements are consistent because the applicant indicates that they do not take into consideration the coatings that are present in the system, which need to be evaluated for aging.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff);

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement in LRA Section A1.9. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.10, Closed-Cycle Cooling Water System

In the PVNGS LRA, the applicant states that AMP B2.1.10, "Closed-Cycle Cooling Water System" is an existing program with an enhancement and exceptions that is consistent with the program elements in GALL Report AMP XI.M21, "Closed-Cycle Cooling Water System." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement in LRA Section A1.10. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program element 2 (preventive actions), element 6 (acceptance criteria), and element 7 (corrective actions). This enhancement expands on the existing program elements by incorporating the guidance of EPRI TR-107396, "Closed Cooling Water Chemistry Guideline," with respect to water chemistry control for frequency of sampling and analysis, normal operating limits, action level concentrations, and time for implementing corrective actions upon attainment of action levels.

In Table A4-1 of the LRA, the applicant committed to implementing this enhancement prior to the period of extended operation.

The first exception affects LRA program element 2 (preventive actions). In the GALL Report AMP, this program element recommends the materials used in the closed-cycle cooling water system to be appropriate to the type of service. Alternatively, this program element in the LRA states that the essential cooling water system for each unit employs an aluminum window as the pressure boundary material between the closed-cycle cooling water and an ionization detector. The PVNGS chemical treatment program does not include controls described in EPRI TR-107396 that are appropriate for aluminum. The applicant has indicated it will maintain the integrity of the aluminum windows through the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.

The second exception affects LRA program element 3 (parameters monitored or inspected) and element 5 (monitoring and trending). In the GALL Report AMP, program element 3 recommends that testing and inspection be conducted as described in EPRI TR-107396 and further states that parameters monitored for pumps include flow, suction pressure, and discharge pressure. Furthermore this element indicates for heat exchangers that the parameters monitored should include flow, inlet and outlet temperatures, and differential pressure. For element 5, the GALL Report AMP indicates that visual inspections and

performance/functional test should be performed to confirm the effectiveness of the closed-cycle cooling water program. Alternatively, this program element in the LRA states that heat exchangers are not monitored for differential pressure for the essential cooling water, spent fuel cooling and cleanup, and shutdown cooling heat exchangers systems. The applicant also indicated that the essential chilled water and essential cooling water system circulating pumps will not be subject to periodic internal visual inspections or nondestructive evaluation of pump casing. Furthermore, the applicant indicated that the ventilation cooling coils in the essential chilled water system are not monitored for differential pressure or subject to visual inspection. In addition, the applicant has indicated that the diesel generator jacket water heat exchanger, turbo air intercooler, turbocharger, and governor lube oil cooler are not individually monitored for flow, inlet and outlet temperatures, differential pressure, and they are not visually inspected internally. The applicant further states that it does not intend to conduct regular periodic inspections and testing of the reactor coolant hot leg sample cooler heat exchanger. The applicant finally takes exception to monitoring for heat exchanger parameters and conducting performance monitoring and inspection to manage aging effects of reduction in heat transfer for the letdown heat exchanger, auxiliary steam vent condenser, cooler for auxiliary steam radiation monitor, cooling coils for the normal HVAC Units, steam generator sampling coolers (hot leg, cold leg, downcomer blowdown), pressurizer steam space and surface line sample coolers, and safety injection sample coolers.

The third exception affects the LRA program element 2 (preventative actions), element 3 (parameters monitored or inspected), element 4 (detection of aging effects), element 5 (monitoring and trending), and element 6 (acceptance criteria). In the GALL Report AMP, these program elements recommend the use of EPRI Close Cooling Water Chemistry Guidelines, TR-107396, Revision 0. Alternatively, the applicant has indicated that the Closed-Cycle Cooling Water System Program is based on Revision 1 of this document which was published in 2004.

During its audit, the staff conducted a service water system and water chemistry walkdown, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "biofouling," "chemistry," "copper," and "pH."

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.10-Rev 1	Closed-Cycle Cooling Water System	Revision 1 5/1/2009
2. 73DP-0AP06	HVAC System Performance Testing Program	Revision 0 10/19/2006
3. 73DP-9XI02	Pump and Valve Inservice Testing Program- Administrative Requirements	Revision 13 7/30/2009
4. 73DP-9ZZ11	Heat Exchanger Program	Revision 9
5. 73ST-9EC01	Essential Chilled Water Pumps – Inservice Test	Revision 22 3/19/2009
6. 73ST-9EW01	Essential Cooling Water Pumps – Inservice Test	Revision 21 1/15/2008
7. 74DP-9CY04	System Chemistry Specifications	Revision 66 11/20/2009
8. CRDR 2618585	(U-1) “NC-A” Heat Exchanger Has a Through the Wall Leak	7/6/2003
9. CRDR 2459393	(U-3) The “B” EW System Indicated Increased Levels of Chloride and Sulfates	11/29/2006
10. CRDR 2647652	CRDR Documents High pH Levels in the Closed Cooling Water Systems (CCWS) that is Causing Elevated Copper Corrosion	9/21/2007

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program as modified by the proposed enhancement. Aspects of program elements 2, 3, 4, 5, and 6 (preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP associated with the exceptions were not evaluated during this audit. Aspects of these program elements that are not associated with the exceptions were evaluated and are described below

During the audit, the staff found that:

elements 2, 3, 4, 5, and 6 (preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether element 1 (scope of program) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element 1 is consistent with the corresponding element of the GALL Report AMP, the staff issued RAI B2.1.10-1 for the following subject:

The GALL Report AMP recommends that the program include, (1) preventative measures to minimize corrosion and SCC, and (2) testing and inspection to monitor the effects of corrosion and SCC on the intended function of the component scoped into the license renewal process. However, during the audit, the staff noted that the applicant’s Closed-Cycle Cooling Water System Program does not conduct internal inspections or performance testing for components in scope of license renewal under 10 CFR

54.4(a)(2). Based on this information, the staff requested that the applicant provide justification for limiting the internal inspections and performance testing on components based upon the criteria that was used to scope these components into the license renewal process.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement in LRA Section A1.10. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1–6 are consistent with corresponding program elements in most of the GALL Report while identifying certain aspects of LRA program element 1 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.11, Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems

In the PVNGS LRA, the applicant states that AMP B.2.11, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems," is an existing program with enhancement that is consistent with the program elements in GALL Report AMP XI.M23 "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement A1.11. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program element 4 (detection of aging effects). This enhancement expands on the existing program element by adding procedures to inspect for loss of material due to corrosion or rail wear.

In Appendix A of the LRA, the applicant committed to implement this enhancement prior to the period of extended operation.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "heavy load," "load," "handling," "crane," "polar," "polar crane," and "overhead."

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. Program Evaluation Report B2.1.11	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	PVNS-AMP-B2.1.11-Rev 2, 12/5/2009
2. CRDR 3076564	Crack Like Linear Indication in Crane	10/14/2007
3. CRDR 2880797	(U-3) During Polar Crane Preparations, A Cracked Weld Was Identified On The Outboard Side of Wheel #7	4/1/2006
4. CRDR 3115337	Polar Crain Rail and Wheels Have Been Rubbing And Shearing Off Metal During 3R13 Outage	12/28/2007
5. CRDR 3380805	Severe Corrosion and Pitting on the Linkbelt 250 Ton Mobile Crane on the Main Cords off of Three Sections	9/18/2009
6. PMB 249143	Containment Pedestal Crane	6/14/2005
7. PMB 258345	150/15 Ton Dry Cask Handling Crane	Rev 1 5/14/2008

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that elements 1, 2, 3, 4, 5, and 6 (scope of program, preventive actions, parameters monitored, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff);

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP,

as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the FSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

verified that LRA program elements 1 - 6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the FSAR Supplement is an adequate description of the program.

LRA AMP B2.1.12, Fire Protection Program

In the PVNGS LRA, the applicant states that AMP B2.1.12, "Fire Protection Program" is an existing program with enhancements and exception that is consistent with the program elements in GALL Report AMP XI.M26, "Fire Protection." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement, Appendix A1.12. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program elements 3, 4, 5 and 6 (parameters monitored/inspected, detection of aging effects, monitoring and trending and acceptance criteria). This enhancement expands on the existing program elements by adding trending requirements for the diesel-driven fire pump and to include visual inspection of the fuel supply line to detect degradation. By letter dated December 7, 2009, the applicant stated that the Fire

Protection Program was revised to incorporate the enhancement to include visual inspection of the fuel supply line to detect degradation and this part of enhancement 1 was therefore deleted.

The second enhancement affects LRA program elements 3, 4, 5, and 6 (parameters monitored/inspected, detection of aging effects, monitoring and trending and acceptance criteria). This enhancement expands on the existing program elements by adding criteria to inspect for mechanical damage, corrosion and loss of material of the carbon dioxide (CO₂) system discharge nozzles.

The third enhancement affects LRA program elements 3, 4, 5, and 6 (parameters monitored/inspected, detection of aging effects, monitoring and trending and acceptance criteria). This enhancement expands on the existing program elements by adding criteria to state the qualification requirements for inspecting penetration seals, fire rated doors, fire barrier walls, ceilings and floors.

In Commitment No. 14 of Table A4-1, the applicant committed to implement these enhancements prior to the period of extended operation.

The first exception affects LRA program elements 3 and 4 (Parameters Monitored or Inspected and Detection of Aging Effects). In the GALL Report AMP, this program element recommends a visual inspection and function test of the Halon and CO₂ systems every six months. Alternatively, this program element in the LRA states, visual inspections and function testing of the Halon and CO₂ fire suppression systems are performed every 18 months per Technical Requirements Manual Surveillance Requirement (TSR) 3.11.106.4 and 3.11.103.4, respectively. By letter dated December 7, 2009, the applicant stated that the Halon and CO₂ dampers are integrity validated every 54 months per Technical Requirements Manual Surveillance Requirement (TSR) 3.11.106.6 and 3.11.103.6.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "seal rupture," "fire degradation" and "diesel fire pump."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.12	PVNGS Aging Management Program Evaluation Report – Fire Protection	3
2. 73DP-0FP01	Fire Protection Test Program Requirement	26
3. 14FT-9FP70	App. R and Former Tech Spec Penetration Seal Surveillance	8
4. 14FT-9FP65	App. R and Former Tech Spec Fire Barrier Surveillance (for walls, floors, ceilings and raceways)	8
5. 33FT-9FP01	App. R and Former Tech Spec Fire Damper Surveillance	6
6. 18FT-9FP33	Functional Test of Appendix A Fire Doors – Auxiliary Building	8
7. 14FT-9FP04	Annual Fire Pump Test	12
8. 14FT-0FP05	Monthly Diesel-Driven Fire Pumps Start and Run	19
9. 14FT-9FP08	CO ₂ Fire Suppression System Functional Test	11
10. 14FT-9FP10	Halon Fire Suppression System Functional Test	18
11. CRDR-3237847	Fire Protection Review of Doors 3AZANDA302	10/17/2008
12. CRDR-3314831	Unit 2 Degraded Deficiency Penetration Seal 2AZYD509*020Z*SealXX	4/17/2009
13. CRDR-3313174	Unit 2 degraded deficiency barrier 2AZCNBA09-E*132-W*Barrier (Seismic gap)	4/14/2009
14. CRDR-3334217	Unit 2 Penetration Conduit Seal 3AZYD486*086Z*SealXX Degraded Deficiency	5/26/2009
15. LDCR 09-R003	Revise TRM surveillance requirements for fire damper testing	11/02/2009

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program as modified by the proposed enhancements. Aspects of program element 3 (parameters monitored or inspected) and program element 4 (detection of aging effects) of the LRA AMP associated with the exception were not evaluated during this audit. Aspects of these program elements that are not associated with the exception(s) were evaluated and are described below.

During the audit, the staff found that:

element numbers 1, 2, 4 and 5 (scope of program, preventive actions, detection of aging effects, and monitoring and trending) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether element numbers 3 and 6 (parameters monitored/inspected, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program elements 3 and 6 are consistent with the corresponding elements of the GALL Report AMP, the staff issued RAI B2.1.12-1 for the following subject:

In the GALL Report AMP element numbers 3 and 6, it states that the diesel-driven fire pump is under observation during performance tests such as flow and discharge tests, sequential starting capability tests, and controller function tests for detection of any degradation of the fuel supply line, and no corrosion is acceptable in the fuel supply line for the diesel-driven fire pump. Review of the PVNGS Fire Protection Program evaluation report indicated that the fuel oil supply line is managed by the Fuel Oil Chemistry and External Surface Monitoring AMPs. The PVNGS Fire Protection Program evaluation report also references procedure 14FT-0FP05, which states in Appendix A, to visually inspect diesel fuel oil supply line for signs of degradation and references the source of the inspection as the LRA. It is not clear which program/procedure is used for performing this inspection and where the acceptance criterion for the inspection is specified.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement A1.12. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1–6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1–6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.13, Fire Water System Program

In the PVNGS LRA, the applicant states that AMP B2.1.13, Fire Water System Program is an existing program with enhancements and exceptions that is consistent with the program elements in GALL Report AMP XI.M-27, "Fire Water System." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement A1.13. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program elements 2 and 6 (preventive actions and acceptance criteria). This enhancement expands on the existing program elements by adding review and approval requirements under the Nuclear Administrative Technical Manual.

The second enhancement affects LRA program element 3 (parameters monitored or inspected). This enhancement expands on the existing program elements by enhancing the procedures to be consistent with the current code of record or Nation Fire Protection Association (NFPA) 25, 2002 Edition.

The third enhancement affects LRA program element 4 (detection of aging effects). This enhancement expands on the existing program elements by adding field service test of a representative sample or replace sprinklers prior to 50 years in service and test thereafter every 10 years to ensure that signs of degradation are detected in a timely manner.

The fourth enhancement affects LRA program element 4 (detection of aging effects). This enhancement expands on the existing program elements by enhancing procedures to be consistent with NFPA 25, Sections 7.3.2.1, 7.3.2.2, 7.3.2.3, and 7.3.2.4.

The fifth enhancement affects LRA program element 7 (corrective actions). This enhancement expands on the existing program elements by enhancing procedures so that the PVNGS Quality Assurance programs will apply to Fire Protection SSCs that are within the scope of license renewal that are also part of the boundary of the Water Reclamation Facility.

In Commitment No. 15 of Table A4-1, the applicant committed to implement these enhancements prior to the period of extended operation.

The first exception affects LRA program element 4 (detection of aging effects). In the GALL Report AMP, this program element recommends visual inspections of gaskets to be performed annually. Alternatively, this program element in the LRA states, visual inspections of power block hose station gaskets are performed every 18 months per Technical Requirements Manual Surveillance Requirement (TSR) 3.11.104.4.

The second exception affects LRA program element 4 (detection of aging effects). In the GALL Report AMP, this program element recommends fire hydrant hose hydrostatic tests to be performed annually. Alternatively, this program element in the LRA states, hydrostatic testing on fire hoses are performed every three years per TSR 3.11.104.6. Replacement fire hoses that have been hydrostatically tested are available if needed in lieu of performing a hydrostatic test.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "biofouling" and "MIC."

The table below lists the documents reviewed by the staff and found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.13	PNNGS Aging Management Program Evaluation Report, Fire Water System – B2.1.13	3
2. 14FT-0FP04	Annual Fire Water Loop Test	19
3. 14FT-9FP23	Fire Suppression Water System Flow Test	8
4. 14FT-9FP34	Fire Hydrant, Street Key, Flush and Post Indicator Valve Operational Testing	13
5. 14FT-9FP13	Fire Hose Station Operational and Hydrostatic Test	9
6. 73DP-0FP01	Fire Protection Test Program Requirements	26
7. 14FT-9FP12	Fire Hose Station Inspection	10
8. 14FT-9FP28	FPN – Spray and/or Sprinkler System Functional Test	18
9. 01DP-0AP12	Palo Verde Action Request Processing	12
10. CRDR-3158124	Sprinkler head failed due to being clogged with rust flakes.	

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program as modified by the proposed enhancements. Aspects of program element 4 (detection of aging effects) of the LRA AMP associated with the exceptions were not evaluated during this audit. Aspects of this program element not associated with the exceptions were evaluated and are described below.

During the audit of program elements 1–6, the staff found that:

elements 1–6 (scope of program, preventive actions, parameters monitored/inspected, detection of aging effects, monitoring and trending, acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement A1.13. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that LRA program elements 1–6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.16, One-Time Inspection Program

In the PVNGS LRA, the applicant states that AMP B2.1.16, "One-Time Inspection Program" is a new program that is consistent with the program elements in GALL Report AMP XI.M32, "One-Time Inspection." The applicant committed to implementing this program prior to the period of extended operation in License Renewal Commitment 18 of LRA Table A4-1, License Renewal Commitments. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: loss of material, stress corrosion, fouling, lube oil, rust, pitting, stress corrosion cracking, microbiological corrosion, corrosion, internal surface corrosion and weld.

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
PVNGS-AMP-B2.1.16-Rev 3	One-Time Inspection	Revision 2
73DP-9EE05	Nuclear Administrative and Technical Manual	Revision 0
B2.1.16	PVNGS LRA, Appendix B, One-Time Inspection	
A1.16	PVNGS LRA, Appendix A, One-Time Inspection	

During the audit of program elements 1–6, the staff found that:

elements 1, 2, 3, 5 and 6 (scope of program, preventive actions, parameters monitored/inspected, monitoring and trending and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether element 4 (detection of aging effects) of the LRA AMP was consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element 4 is consistent with the corresponding elements of the GALL Report AMP, the staff issued RAI B2.1.16-2 for the following subject:

The Nuclear Administrative and Technical Manual, One Time Inspection Program (73DP-9EE05), states that examination techniques will be selected as appropriate for each specific one-time inspection. It is not clear how surface examinations will be used to detect cracking.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e. no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience identified by the staff's independent database search and supplemented by the applicant is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff issued RAI B2.1.16-1 for the following subject:

The LRA states that a review of the PVNGS plant specific OE associated with the Inservice Inspection (ISI) Program has not revealed any ISI adequacy issues. Although

there is no plant specific operating experience associated with the PVNGS ASME Section XI ISI Program that revealed ISI adequacy issues, any operating experience resulting from maintenance activities should be included for systems and components that will be subjected to the One-Time Inspection Program.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1–6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1–6 for which additional information or additional evaluation is required before consistency can be determined;

identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program description in the UFSAR Supplement.

LRA AMP B2.1.17, Selective Leaching of Materials Program

In the PVNGS LRA, the applicant states that AMP B2.1.17, “Selective Leaching of Materials Program” is a new program with an exception that is consistent with the program elements in GALL Report AMP XI.M33, “Selective Leaching of Materials.” The applicant committed to implementing this program prior to the period of extended operation in Commitment No. 19 of Table A4-1. To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of the exception. Issues identified but not resolved in this report are addressed in the SER.

The exception affects LRA program elements 1 - 4 (scope of program, preventive actions, parameters monitored or inspected, and detection of aging effects). The GALL Report AMP recommends hardness testing of sample components in addition to visual inspections. Alternatively, the LRA AMP involves the use of other mechanical means (e.g., scraping or chipping) for a qualitative determination of selective leaching.

During its audit, the staff interviewed the applicant’s staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant’s operating experience database using keywords: “leaching,” “dealloying,” and “graphitization.”

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.17	PVNGS Aging Management Program Evaluation Report – Selective Leaching of Materials	Revision 4 12/1/2009
2. 73DP-9EE06	One-Time Inspection for Selective Leaching Degradation of Components	Revision 0 7/31/2009
3. CRDR 60126	Pinhole Leak from Interrial Pipe Corrosion	1/18/1996
4. Information Notice 94-59	Accelerated Dealloying of Cast Aluminum-Bronze Valves Caused by Microbiologically Induced Corrosion	8/17/1994

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program. Aspects of program elements 1-4 (scope of program, preventive actions, parameters monitored or inspected, and detection of aging effects) of the LRA AMP associated with the exception were not evaluated during this audit. Aspects of these elements not associated with the exception were evaluated and are described below.

During the audit, the staff found that:

elements 1–6 (Scope of Program, preventive actions, Parameters Monitored or Inspected, Detection of Aging Effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff).

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that LRA program elements 1–6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.18, Buried Piping and Tanks Inspection Program

In the PVNGS LRA, the applicant states that AMP B2.1.18, “Buried Piping and Tanks Inspection Program” is a new program with an exception that is consistent with the program elements in GALL Report AMP XI.M34, “Buried Piping and Tanks Inspection.” The applicant committed to implementing this program prior to the period of extended operation in Commitment No. 20 of Table A4-1. To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The exception affects LRA program elements 1, 2, and 6 (scope of program, preventive actions, and acceptance criteria). The GALL Report AMP only includes buried steel piping and relies on preventive measures such as coatings and wrappings to mitigate corrosion. Alternatively, the LRA AMP also includes buried stainless steel piping with no coatings or wraps. The LRA AMP states that buried stainless steel piping will be inspected for loss of material due to general, pitting, crevice, and microbiologically influenced corrosion.

During its audit, the staff conducted a walkdown of the buried piping and tanks facilities, interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant’s operating experience database using keywords: “buried piping,” “steel piping,” “coating degradation,” and “piping corrosion.”

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.18	PVNGS Aging Management Program Evaluation Report – Buried Piping and Tanks Inspection	Revision 5 12/2/2009
2. 83PR-0AP01	Buried Piping and Tanks Inspection Program	Revision 0
3. No Document Number	Underground Piping Project – Establish Priorities and Inspection Program	Revision 2 9/17/2002
4. CRDR 2861585	Water Leak from Fire Protection Equipment Near Retention Basins Plant	1/14/2006
5. CRDR 2849220	Leak in the Fire Protection Water in the North Yard Area	11/26/2005
6. CRDR 2615008	Fire Protection System Leak 50 Yards Down Stream of PIV83	6/21/2003
7. CRDR 2325095	Results of NDE Testing on FP Piping	9/29/2000

The staff conducted its audit of LRA program elements 1–6 based without considering aspects of program elements 1, 2, and 6 (scope of program, preventive actions, and acceptance criteria) of the LRA AMP which are associated with the exception. Aspects of these elements not associated with the exception were evaluated and are described below.

During the audit, the staff found that:

elements 1–6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify the applicant's operating experience supports the sufficiency of the LRA AMP, the staff issued RAI B2.1.18-1 for the following subject:

In element 10 of the applicant's basis document, PVNGS-AMP-B2.1.18, it includes a discussion of relevant plant-specific operating experience. Based on the information provided in the basis document, it is not clear to the staff how other relevant industry operating experience was considered during the development of the AMP.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that LRA program elements 1–6 are consistent with corresponding program elements in the GALL Report AMP;

identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.19, One-Time Inspections of ASME Code Class 1 Small Bore Piping

In the PVNGS LRA, the applicant states that AMP B2.1.19, “One-Time Inspection Program” is a new program that is consistent with the program elements in GALL Report AMP XI.M35, “One-Time Inspections of ASME Code Class 1 Small Bore Piping.” The applicant committed to implementing this program prior to the period of extended operation in License Renewal Commitment 21 of LRA Table A4-1, License Renewal Commitments. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria), program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant’s staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant’s operating experience database using keywords: loss of material, stress corrosion, stress corrosion cracking, fouling, pitting, corrosion, weld.

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
PVNGS-AMP-B2.1.19-Rev 2	One-Time Inspection of ASME Code Class 1 Small-Bore Piping	Revision 2
73TI-9ZZ88	Ultrasonic Examination of Socket Welds	Revision 0
LER 87-18, Rev 1	Update on Reactor Trip Occurs during Shutdown Due to Pressure Boundary Leakage	8/27/1987
LER 1996-006	Cracked Weld on HPSI Minimum Recirculation Line Forces TS LCO 3.0.3 Entry	10/29/1996
LER 2004-01	Reactor Shutdown Due to Reactor Coolant System Pressure Boundary Leakage	2/2004

During the audit of program elements 1–6 , the staff found that:

elements 2, 4, 5 and 6 (preventive actions, Parameters Monitored/Inspected, and Acceptance Criteria, Monitoring and Trending) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether elements 1 and 3 (scope of program and detection of aging effects) of the LRA AMP was consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program elements 1 and 3 are consistent with the corresponding elements of the GALL Report AMP, the staff issued RAIs B2.1.19-1, B2.1.19-2, and B2.1.19-3 for the following subjects:

GALL AMP element 1 recommends using guidelines in EPRI Report 1000701, “Interim Thermal Fatigue Management Guideline (MRP-24),” January 2001 to identify piping susceptible to potential effects of thermal stratification or turbulent penetration. The LRA states that guidelines from EPRI TR-112657, “Revised Risk-Informed Inservice Inspection Evaluation Procedure,” Rev. B-A, were used for identifying susceptible piping instead of EPRI Report 1000701. The LRA further states that the recommended inspection volumes for both methods are identical.

The staff noted that although the inspection volumes are identical, it is not clear if the welds with the highest likelihood of degradation will be inspected, e.g., welds with the highest stress but not necessarily highest risk category.

The staff reviewed the applicant’s selection of welds that would be subjected to volumetric one-time inspection based on the risk-informed method and found that only butt welds would be inspected. The staff noted that although the butt welds to be inspected have the highest risk, the environment of butt welds is not the same as for socket welds due to the crevice inherent in socket welds; the crevice could lead to corrosion or SCC in socket welds which could be missed if only butt welds are inspected.

GALL AMP element 3 states that inspections will detect cracking in ASME Code Class 1 small-bore piping.

The LRA states socket welds that fall within the weld examination sample will be examined following ASME Section XI Code requirements. The LRA further states that if a qualified

volumetric examination procedure for socket welds endorsed by the industry and the NRC is available and incorporated into the ASME Section XI at the time of PVNGS small-bore socket weld inspections then volumetric examinations will be conducted on small-bore socket welds. The staff notes that if a volumetric examination procedure for socket welds endorsed by the industry and the NRC is not available and incorporated into the ASME Section XI at the time of PVNGS small-bore socket weld inspections then present ASME Section XI Code requirements will be used for examination of socket welds. The staff also notes that present ASME Section XI Code only requires surface examination for small-bore piping but surface examination will not detect cracking that initiates on the inside of the piping before leakage occurs.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience identified by the staff's independent database search and supplemented by the applicant is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff will consider issuing RAIs for the following subjects:

The staff's independent review of the PVNGS plant-specific operating history found two additional incidences of cracking of small-bore piping. Based on these instances of cracking of small-bore piping, the applicant is requested to either provide a plant-specific AMP that includes periodic inspections to manage aging, or provide justification why a plant-specific AMP is not necessary for ASME Code Class 1 small-bore piping.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1–6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1–6 for which additional information or additional evaluation is required before consistency can be determined;

identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program description in the UFSAR Supplement.

LRA AMP B2.1.20, External Surfaces Monitoring Program

In the PVNGS LRA, the applicant states that AMP B2.1.20, “External Surfaces Monitoring” is a new program that, with an exception, is consistent with the program elements of the GALL Report AMP XI.M36, “External Monitoring Program”. The applicant committed to implementing this program prior to the period of extended operation in Commitment No. 22 of Table A4-1. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The applicant’s program presents an exception to the GALL Report XI.M36, by the inclusion of aluminum, copper alloys, and elastomeric materials whereas the GALL Report for this AMP is limited to steel. The exception proposed by extending the AMP to cover the additional material types affects LRA program element 3 (parameters monitored or inspected) and element 4 (detection of aging effects).

During its audit, the staff conducted a walkdown of plant environment and materials, interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant’s operating experience database using keywords: “corrosion,” “stress corrosion,” “pitting,” “piping corrosion,” “rust,” “loss of material,” “degradation,” “copper,” and “aluminum.”

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.20	PVNGS Aging Management Program Evaluation Report External Surfaces Monitoring Program	Rev 2, 12/2/2009
2. 73DP-9EE04	External Surface Inspection	Revision 4
3. 73TD-0ZZ03	System Engineering Handbook	Rev 11 11/5/2009
4. 01DP-0AP12	Palo Verde Action Request Processing	Revision 12 (Document Not Dated)
5. CRDR 2330154	Condition Report/Disposition Request Documenting a Pressure Boundary Leak on the Downcomer Sample Line Upstream of SGE-V423 (ASME Code 2 Pipe)	Revision 0, 6/21/2007
6. CRDR 2346711	Condition Report/Disposition Request Documenting Corrosion in Various Components and Structures Associated With the Water Reclamation Supply System	Revision 0, 6/21/2007
7. CRDR 2532218	Condition Report/Disposition Request Documenting Corrosion On Valves Identified During A Functional Assessment of the Auxiliary Feedwater System	Revision 0, 11/6/2007
8. CRDR 2823717	Condition Report/Disposition Request Documenting Rust Observed On Flow-Indicating Steel Mounting Flanges	Rev 0, 5/8/2007
9. CRDR 2880283	Condition Report/Disposition Request Documenting Coating Flaking and Peeling On the Unit 3 Spray Pond Flow Transmitter Hardware	Rev 0, 11/15/2007

The staff conducted its audit of LRA program elements 1–6 without considering aspects of program elements 3 and 4 (parameters monitored or inspected, and detection of aging effects) of the LRA AMP which are associated with the exception. Aspects of these elements not associated with the exception were evaluated and are described below.

During the audit, the staff found that:

elements 1, 2, 5, and 6 (scope of program, preventive actions, monitoring and trending, and acceptance criteria), of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether elements 3 and 4 (parameters monitored or inspected, and detection of aging effects) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program elements numbers 3 and 4 are consistent with the corresponding elements of the GALL Report AMP, the staff issued RAIs B.2.1.20-1 and B2.1.20-2 for the following subjects:

In element 3 of the LRA AMP, the applicant has included physical manipulation to visual inspection to detect the aging artifacts associated with elastomeric materials such as hardening, surface texture changes. However, according to the applicant's AMP, physical manipulations are not to be conducted on inaccessible components. Further information is required to determine how the AMP will effectively be applied to inaccessible components.

In element 4 of the LRA AMP, it states that detection of aging will be accomplished via visual inspection. In the GALL Report AMP it states that visual inspection is considered sufficient. However, the GALL AMP is intended only for steel and aluminum is not as conducive to visual inspection to detect degradation. It is not clear to staff how visual inspection will be administered sufficiently to address the aging artifacts of aluminum.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement, Appendix A1.20. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1–6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1–6 for which additional information is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.22, Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components

In the PVNGS LRA, the applicant states that AMP B2.1.22, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" is a new program with exception that is consistent with the program elements in GALL Report AMP, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components." The applicant committed to implementing this program prior to the period of extended operation in Commitment 22 of Table A4-1. To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the FSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not

consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The exception affects LRA program elements 1, 3, 4, and 5 (parameters monitored or inspected, detection of aging effects, and monitoring and trending). The GALL Report AMP, recommends a program of visual inspections of the internal surfaces of miscellaneous steel piping and ducting components to ensure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions. Alternatively, the LRA increases the scope of the materials inspected to include stainless steel, aluminum, copper alloy and elastomers, in addition to steel. The LRA AMP also increases the scope of aging effects to include hardening and loss of strength for elastomers. Lastly, the LRA AMP augments the visual inspections by physical manipulation to detect hardening and loss of strength of elastomers and volumetric evaluation to detect stress corrosion cracking of the internal surfaces of stainless steel components exposed to diesel exhaust.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "internal," "surface," and "corrosion."

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. Program Evaluation Report B2.1.22	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	PVNGS-AMP-B2.1.22-Rev 3
2. CRDR 2985171	Unit 3 SG#2 Moisture Separators Continued Degradation	3/22/2007
3. CRDR 3082509	Intercooler Inlet and Outlet piping was Found Degraded, Flaking of Internal Coating	10/24/2007
4. CRDR 3207797	Valve Body Erosion	8/7/2008
5. CRDR 3163679	2B EDG Intercooler Cover Plate Removed for Coating Work During 2R14	4/22/2008
6. CRDR 3163901	Corrosion in the Spray Pond Nozzle Housing Thermal Well	4/22/2008
7. CRDR 3164258	The 6 Spray Pond Filter Pumps	4/23/2008
8. CRDR 3207021	Valve Body Erosion	8/5/2008
9. CRDR 3311261	Small Weld Repair Needed on Partition Plate of DG Jacket Water Cooler	4/9/2009
10. CRDR 3145052	Internal Corrosion and Failed Internal Coating in Spray Pond Backwash Line to the CW Intake Canal	3/12/2008

The staff conducted its audit of LRA program elements 1-6 without considering aspects of program elements 1 (scope of program), 3 (parameters monitored or inspected), 4 (detection of aging effects), and 5 (monitoring and trending) of the LRA AMP associated with the exceptions. Aspects of these program elements that are not associated with the exceptions were evaluated and are described below.

During the audit, the staff found that:

element 2 (preventive actions) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP; and

elements 1 (scope of program), 3 (parameters monitored or inspected), 4 (detection of aging effects), 5 (monitoring and trending), and 6 (acceptance criteria) of the LRA AMP were not strictly consistent with the corresponding elements of the GALL Report AMP but that sufficient information was available to allow the staff to determine that these elements of the LRA AMP are equivalent to the corresponding elements of the GALL Report AMP.

The basis for the staff's determination that elements 1 (scope of program), 3 (parameters monitored or inspected), 4 (detection of aging effects), 5 (monitoring and trending), and 6 (acceptance criteria) of the LRA AMP are equivalent to the corresponding GALL Report AMP is: the GALL Report elements give general recommendations for each of these elements, while the PVNGS LRA for these elements gave specific details of how each element will meet the corresponding GALL Report elements.

The applicant stated that, for fire protection piping, indications of pipe wall thickness and indications of pipe diameter narrowing will be determined. The staff requested that the applicant provide details on how the pipe wall thickness and indications of pipe diameter narrowing will be determined.

During the audit of program element 10 (Operating Experience), the staff found that:

the operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience identified by the staff's independent data base search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that LRA program elements 1–6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging;

verified that the description provided in the FSAR Supplement is an adequate description of the program.

LRA AMP B2.1.23, Lubricating Oil Analysis Program

In the PVNGS LRA, the applicant states that AMP B2.1.23, "Lubricating Oil Analysis Program" is an existing program with exceptions that is consistent with the program elements in GALL Report AMP XI.M39, "Lubricating Oil Analysis." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first exception affects LRA program elements 3 and 6 (parameters monitored/inspected and acceptance criteria). In the GALL Report AMP, these program elements recommend that for components with periodic oil changes 1) a particle count to detect evidence of abnormal wear rates or excessive corrosion and 2) particle concentration will be determined in accordance with industry standards. Alternatively, the program elements in the LRA state, the Lubricating Oil Analysis program relies on elemental analysis techniques described in ASTM D 6595 to measure parts per million levels of metals instead of particle counting for diesel engine oils.

The second exception affects LRA program elements 3 and 6 (parameters monitored/inspected and acceptance criteria). In the GALL Report AMP, this program element recommends that for components that do not have regular oil changes, flash point is used to verify the oil is suitable for continued use. Alternatively, the program elements in the LRA state, the Lubricating Oil Analysis program considers flash point an indicator of fuel oil contamination of lubrication oil and therefore only lubricating oil in components with a potential of contamination with fuel oil will be subjected to flash point testing.

The third exception affects LRA program elements 3 and 6 (parameters monitored/inspected and acceptance criteria). In the GALL Report AMP, this program element recommends that for components that do not have regular oil changes, neutralization number is determined to verify the oil is suitable for continued use. Alternatively, the program elements in the LRA state, the Lubricating Oil Analysis program tests diesel engine lubrication oils using Total Base Number for evaluations of lubricant in engine applications; Total Acid Number is not used for evaluations of lubricant in engine applications because it is of limited utility in these applications.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "lube oil", "loss of material", "rust", "pitting", and "corrosion".

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
PVNGS-AMP-B2.1.23-Rev 2	Lubricating Oil Analysis	Revision 2
37DP-9MP04	Lubricant Evaluations	Revision 12
31FT-9RC01	RCP Lube Oil Collection System Inspection	Revision 6
37DP-9MP01	Predictive Maintenance	Revision 6
37DP-9MP02	Predictive Maintenance Laboratory Operations and Test Methods	Revision 19
ASTM D 6595 - 00	Determination of Wear Metals and Contaminants in Used Lubricating Oils or Used Hydraulic Fluids by Rotating Disc Electrode Atomic Emissions Spectroscopy	2005
PVAR 3411507	Lower Motor Bearing Oil Sample Contained Abnormal Water Content (2643 ppm)	12/3/2009
PVAR 3371056	Oil Sample from 2MPWNP01A, Motor Lower Bearing Testing Indicated Excessive Water Content Present	8/28/2009
CRDR 84204	(U-1) Diesel Generator "A" Failed to Start During Post Maintenance Retest	3/17/2005
CRDR 2782680	Significant Root Cause Investigation Report, Emergency Diesel Generator 1A Failure to Attain Rated Voltage/Frequency	Revision 0

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program. Aspects of program element 3 (Parameters Monitored/Inspected), and element 6 (acceptance criteria) of the LRA AMP associated with the exceptions were not evaluated during this audit. Aspects of these program elements that are not associated with the exceptions were evaluated and are described below.

During the audit, the staff found that:

element 1, 2, 4, and 5 (scope of program, preventive actions, detection of aging effects, monitoring and trending) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether elements 3 and 6 (parameters monitored/inspected and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element numbers 3 and 6 are consistent with the corresponding elements of the GALL Report AMP, the staff issued RAIs B2.1.23-1, B2.1.23-2, and B2.1.23-3 for the following subjects:

Element 6 of the LRA AMP refers to Lubricant Evaluations, revision 12, 37DP-9MP04; it is stated that exceeding testing criteria of Appendix A is not necessarily the point where lubricating oil is non-conforming. The staff noted that the sources of acceptance criteria are not identified and Lubricant Evaluations, revision 12, 37DP-9MP04 allows use of lubrication oil with parameters outside the limits of the acceptance criteria based on a justification for doing so and a sampling interval such that the condition of the oil is adequately monitored.

In element 3 of the PVNGS Aging Management Program Evaluation Report for Lubricating Oil Analysis, B2.1.23, the applicant stated that diesel engine lubricating oil is tested for the Total Base Number but not the Total Acid Number, because the Total Acid number is of limited use for diesel engine lubrication oil applications; additionally, it is stated that the Total Acid Number is used for evaluating lubrication oils in other components. It is not clear why only the Total Base Number is used for monitoring lubricating oil in diesel engines and what lubricating oil of other components will be monitored for Total Acid Number.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff found that sufficient information was available to determine whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP.

Based on this audit the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.24, Electrical Cables and Connectors Not Subject To 10 CFR 50.49 Environmental Qualification Requirements Program

In the PVNGS LRA, the applicant states that AMP B2.1.24, "Electrical Cables and Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements Program" is a new program that is consistent with the program elements in the GALL Report AMP XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." The applicant committed to implementing this program prior to the period of extended operation in Commitment No. 25 of Table A4-1, License Renewal Commitments. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria), program

element 10 (operating experience), and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "cables," "connections," "cracking," "melting," "discoloration," and "embrittlement."

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.24	PVNGS Aging Management Program Evaluation Report Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements	Revision 3, 12/02/09
2. 82DP-0EE01	Electrical Aging Management	Revision 0
3. PVARs/CRDRS	PVNGS License Renewal Aging Management CRDR Operating Experience Report for AMP XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements	12/4/09
4. TR-11PV	Electrical Component Aging Evaluation License Renewal Technical Report Palo Verde Nuclear Generating Station	Rev. 0

During the audit of program elements 1–6 , the staff found that elements 2, 3, 4, 5 and 6 (preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

Sufficient information was not available to determine whether element 1 (scope of program) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP. In order to obtain the information necessary to verify whether the LRA program element number 1 is consistent with the corresponding elements of the GALL Report AMP, the staff issued RAI B2.1.24-1 for the following subject:

The GALL Report AMP, XI.E1, under scope of program, states that this inspection program applies to accessible electrical cables and connections within the scope of license renewal that are installed in adverse localized environments. Non-EQ electrical containment penetrations may be installed in adverse localized environments. The scope of program B2.1.24 does not include the electrical containment penetrations.

During the audit of program element 10 (Operating Experience), the staff found that:

the operating experience identified by the staff's independent data base search and supplemented by the applicant is bounded by industry operating experience (i.e. no previously unknown aging effects were identified by the applicant or the staff);

the operating experience identified by the staff's independent data base search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the FSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1–6 are consistent with corresponding program elements in most of the GALL Report while identifying certain aspects of LRA program element 1 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging

verified that the description provided in the FSAR Supplement is an adequate description of the program.

LRA AMP B2.1.25, Electrical Cables and Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements Used In Instrumentation Circuits

In the PVNGS LRA, the applicant states that AMP B2.1.25, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits" is an existing program with enhancements that is consistent with the program elements in the GALL Report AMP XI.E2, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria), program element 10 (operating experience), and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program element 1 (scope of program). This enhancement expands the existing program element by expanding the procedures to identify license renewal scope. The second enhancement affects LRA program element 4 (detection of aging effects). This enhancement requires an evaluation of calibration results.

In Commitment No. 27 of Table A4-1 of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant.

The staff also conducted independent searches of the applicant's operating experience database using the words, "cables," "connections," "cracking," "melting," "discoloration," and "embrittlement."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.25	PVNGS Aging Management Program Evaluation Report Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements Used in Instrumentation Circuits B2.1.25	Rev. 2, 12/01/09
2. 82DP-0EE01	Electrical Aging Management	Rev. 0
3. PVARs/CRDRS	PVNGS License Renewal Aging Management CRDR Operating Experience Report for AMP XI.E2, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Requirements Used in Instrumentation Circuits B2.1.25	12/4/09
4. TR-11PV	Electrical Component Aging Evaluation License Renewal Technical Report Palo Verde Nuclear Generating Station	Rev. 0

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that elements 2, 3, 5, and 6 (preventive actions, parameters monitored or inspected, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

Sufficient information was not available to determine whether elements 1 and 4 (scope of program and detection of aging effects) of the AMP were consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program elements 1 and 4 are consistent with the corresponding elements of the GALL Report AMP, the staff issued RAIs B2.1.25-1 and B2.1.25-2 for the following subjects:

GALL XI.E2 under scope of program states that this program applies to electrical cables and connections (cable system) used in circuits with sensitive, high voltage, low-level signals such as radiation monitoring and nuclear instrumentation that are subject to an aging management review. PVNGS AMP B2.1.25 under the same program attribute only includes the ex-core neutron monitoring system cable system (nuclear instrumentation). The scope of AMP B2.1.25 is not consistent with those in GALL XI.E2 because it does not include high range radiation monitoring.

GALL XI.E2 under detection of aging effects states that in cases where a calibration or surveillance program does not include the cabling system in the surveillance, the applicant will perform cable system testing. In PVNGS AMP B2.1.25, under the same program attribute, the applicant states the ex-core neutron monitoring system are

calibrated every 18 months in accordance with scheduled surveillance and maintenance testing procedures. GALL Report recommends cables, which are disconnected during scheduled surveillance are to be tested separately.

During the audit of program element 10 (Operating Experience), the staff found that:

the operating experience identified by the staff's independent data base search and supplemented by the applicant is bounded by industry operating experience (i.e. no previously unknown aging effects were identified by the applicant or the staff);

the operating experience identified by the staff's independent data base search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the FSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1 - 6 are consistent with corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging;

verified that the description provided in the FSAR Supplement is an adequate description of the program.

LRA AMP B2.1.26, Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

In the PVNGS LRA, the applicant states that AMP B2.1.26, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements" is a new program that is consistent with the program elements in GALL Report AMP XI.E3, "Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." The applicant committed to implementing this program prior to the period of extended operation in Commitment No. 28 of Table A4-1. To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walk downs, interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant’s operating experience database using keywords: “manhole,” “electrical,” “duct bank,” “water,” “submergence,” “cable,” “water tree,” “electrical tree,” and “underground.” Further, the staff performed a search of site specific operating experience for the period 2000 through October 2009. Databases were searched using various key word searches and then reviewed by technical auditor staff. Databases searched include: Generic Letters, Bulletins, Regulatory Issue Summaries, Licensee Event Reports, Event Notifications, Inspection Findings and Inspection Reports.

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.26	PVNGS Aging Management Program Evaluation Report. Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements – B2.1.26. NUREG 1801 Program XI.E3	Revision 3 Date: 12/4/2009
2. 82DP-0EE01	Electrical Aging Management	Revision 0 Date: N/A
3. TR-11PV	Electrical Component Aging Evaluation License Renewal Technical Report	Revision 0 Date: 1/22/2007
4. XI.E3 Aging Management WO OE Report	XI.E3 Aging Management WO OE Report	Revision N/A Date N/A
5. XI.E3 Aging Management CRDR OE Report	XI.E3 Aging Management CRDR OE Report	Revision N/A Date N/A
6. XI.E3 Aging Management Industry OE Report	XI.E3 Aging Management Industry OE Report	Revision N/A Date N/A
9. 81DP-0AP04	Electrical Manhole and Underground Vault Program	Revision 1 Date N/A
10. PMB-2590671 Proposed Revision	Proposed Revision to Preventive Maintenance Basis PMB-2590671	Revision N/A Date N/A
Basis PMB-2590671	Palo Verde Nuclear Generating Station Preventive Maintenance Program – Electrical Manholes/Maintenance of Electrical Manholes	Report Date 12/1/2009

During the audit of program elements 1–6, the staff found that:

elements 1–6 (scope of program, preventive action, parameters monitored/inspected, detection of aging effects, monitoring and trending, and acceptance criteria) were consistent with the corresponding elements of the GALL Report AMP XI.E3.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience identified by the staff’s independent database searches and supplemented by the applicant is bounded by industry operating experience (i.e. no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience identified by the staff's independent database searches and supplemented by the applicant is not sufficient to allow the staff to verify that the LRA

AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff issued RAI B2.1.26-1 for the following subject:

The staff's independent review and the applicant's operating experience review reference corrective action program documents containing cases of water intrusion and cable submergence. The applicant's operating experience with cable submergence and water intrusion is not consistent with limiting cable exposure to significant moisture as referenced by GALL XI.E3 (i.e., periodic actions are taken to prevent cables from being exposed to significant moisture).

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP.

In order to obtain the information necessary to verify the sufficiency of the UFSAR Supplement program description, the staff issued RAI B2.1.26-2 for the following subject:

SRP-LR section 3.6.2 includes acceptance criteria for evaluating the UFSAR summary description including that the applicant has provided information equivalent to that in SRP-LR Table 3.6-2. The staff reviewed LRA, Appendix A, Section A1.26, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," and finds the applicant's UFSAR summary description is not equivalent to SRP-LR Table 3.6-2 in that the applicant's summary description does not include definitions of significant moisture, significant voltage, and minimum electrical manhole inspection frequencies.

Based on this audit the staff:

verified that LRA program elements 1–6 are consistent with corresponding program elements in the GALL Report;

identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

identified a need for additional information regarding the adequacy of the program description in the FSAR Supplement.

LRA AMP B2.1.27, ASME Section XI, Subsection IWE

In the PVNGS LRA, the applicant states that AMP B2.1.27, "ASME Section XI, Subsection IWE" is an existing program with exceptions, that is consistent with the program elements in GALL Report AMP XI.S1, "ASME Section XI, Subsection IWE." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first exception affects LRA program element 1 (scope of program). In the GALL Report AMP, this program element recommends including containment seals and gaskets within the scope of the program. Alternatively, this program element in the LRA states, that pressure retaining containment seals and gaskets are not addressed by the applicant's program, which conforms to the 2001 Edition of ASME Section XI. The LRA further states that these components are evaluated per the 10 CFR 50, Appendix J program.

The second exception affects LRA program element 3 (parameters monitored or inspected). In the GALL Report AMP, this program element discusses seven categories of examination per Table IWE-2500-1. However, this program element in the LRA states, that the program is in accordance with the 2001 Edition of the ASME Section XI code, which does not specify seven categories of examination in Table IWE-2500-1.

The third exception affects LRA program element 5 (monitoring and trending). In the GALL Report AMP, this program element recommends reexamining flaws accepted by engineering evaluation for three consecutive inspection periods. The GALL Report program element also discusses additional examinations per IWE-2430. Alternatively, this program element in the LRA states, that the program is in accordance with the 2001 Edition of the ASME Section XI code, which recommends reexamining flaws during the next inspection period and deletes IWE-2430.

The fourth exception affects LRA program elements 6, 7, and 8 (acceptance criteria, corrective actions, confirmation process). In the GALL Report AMP, these program elements refer to acceptance criteria discussed in Table IWE-3410-1. Alternatively, these program elements in the LRA state, that Table IWE-3410-1 was deleted prior to the issuance of the 2001 Edition of ASME Section XI. The LRA further states that the acceptance standards previously specified in Table IWE-3410-1 are now given in Section IWE-3500.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "degradation," "corrosion," "containment."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. 1INT.IWE-1	Inservice Inspection Examination Program Summary for ASME Section XI, Subsection	Revision 0
2. 09-VT-1004	Visual Examination of IWE Surfaces	3/25/2009
3. 09-VT-2110	Visual Examination Report	11/20/09

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program. Aspects of program elements 1, 3, 5, 6, 7, and 8 (scope of program, parameters monitored or inspected, monitoring and trending, acceptance criteria, corrective actions, and confirmation process) of the LRA AMP associated with the exceptions were not evaluated during this audit. Aspects of these program elements that are not associated with the exceptions were evaluated and are described below.

During the audit, the staff found that:

elements 2, 3, 4, and 5 (preventive action, parameters monitored or inspected, detection of aging effects, monitoring and trending) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether elements 1 and 6 (scope of program, acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element numbers 1 and 6 are consistent with the corresponding elements of the GALL Report AMP, the staff issued RAIs B2.1.27-2 and B2.1.27-4 for the following subjects:

In element 1 of the GALL Report AMP it states that containment pressure-retaining bolting is within the scope of the program; however, it is not clear to the staff how the applicant's program monitors or inspects high strength pressure-retaining bolts for aging management.

Element 6 of the GALL Report AMP requires that containment steel material loss exceeding 10 percent of the nominal containment wall thickness, or material loss that is projected to exceed 10 percent wall thickness before the next examination, is documented. Such areas are to be accepted by engineering evaluation or corrected by repair or replacement in accordance with IWE-3122. It is not clear to the staff how this requirement is being captured in the applicant's AMP.

During the audit of program element 10 (operating experience), the staff found that:

The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

The operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff issued RAI B2.1.27-3 for the following subject:

It is not clear to the staff whether the applicant has considered containment liner plate corrosion concerns identified in NRC Information Notice 2004-09, or recent industry operating experience related to Beaver Valley liner plate corrosion.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1–6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1–6 for which additional information or additional evaluation is required before consistency can be determined;

identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

verified that the description provided in the FSAR Supplement is an adequate description of the program.

LRA AMP B2.1.28, ASME Section XI, Subsection IWL

In the PVNGS LRA, the applicant states that AMP B.2.1.28, "ASME Section XI, Subsection IWL" is an existing program that is consistent with the program elements in GALL Report AMP XI.S2, "ASME Section XI, Subsection IWL." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "containment concrete," "prestressing," and "IWL."

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.28	PVNGS Aging Management Program Evaluation Report	Revision 3 12/4/2009
2. 73ST-1ZC01	Tendon Integrity, Unit 1	Revision 10
3. CRDR 3-3-0454	Condition Report – Grease Leakage	8/5/1994
4. Letter	PVNGS – Effect of Filler Grease on Concrete- letter from Jesse R. Wyatt, PE to Keith Jackson	7/29/1994
5. Dwg 13-C-ZCS-175	Containment Building Prestressing Requirements, General Arrangement	Revision 9 10/01/2009

During the audit of program elements 1–6, the staff found that:

elements 1, 2, 3, 5, and 6 (scope of program, preventive actions, parameters monitored or inspected, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;

sufficient information was not available to determine whether element 4 (detection of aging effects) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element number 4 is consistent with the corresponding elements of the GALL Report AMP, the staff issued RAI B2.1.28-2 for the following subject:

In element 4 of the LRA AMP it states that the PVNGS is beyond ten years of commercial operation and the frequency of concrete exams is ten years, plus or minus one year. Unit 1 will be inspected at 5 years, and every 10 years thereafter. Units 2 and 3 will be inspected at 10 years, and every 10 years thereafter. In the GALL Report, AMP.XI.S2, "ASME Section XI, Subsection IWL Program," Element 4, and ASME Section IWL-2410, require that the inspection of concrete surfaces at 1, 3, and 5 years following the structural integrity test. Thereafter, inspections are performed at 5 year intervals. It is not clear to the staff that these statements are consistent because the frequency of concrete inspections in the GALL Report and LRA AMP are different.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify that the applicant's operating experience supports the sufficiency of the LRA AMP, the staff issued RAI B2.1.28-1 for the following subject:

The GALL Report AMP XI.S2, "ASME Section XI, Subsection IWL Program," element 10, states that implementation of ASME Section XI, Subsection IWL, in accordance with 10 CFR 50.55a, is a necessary element of aging management for concrete containments through the period of extended operation. However, PVNGS AMP B2.1.28, element 10 states that existing PVNGS Tendon Integrity Surveillance procedures are regulated per and in compliance with Regulatory Guide (RG) 1.35. The applicant needs to explain why PVNGS Tendon Integrity Surveillance procedures are regulated by RG 1.35 instead of 10 CFR 50.55a.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1–6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1–6 for which additional information or additional evaluation is required before consistency can be determined;

identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.29, ASME Section XI, Subsection IWF

In the PVNGS LRA, the applicant states that AMP B2.1.29, "ASME Section XI, Subsection IWF" is an existing program that is consistent with the program elements in GALL Report AMP XI.S3, "ASME Section XI, Subsection IWF." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "degradation," "cracking," "support."

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.29	AMP Evaluation Report, ASME Section XI, Subsection IWF	Revision 3 12/3/2009
2. 73DP-9XI03	ASME Section XI Inservice Inspection	Revision 11
3. 3INT-ISI-1	3rd Inspection Interval, Inservice Inspection Program Summary Manual, PVNGS Unit 1	Revision 0
4. 73TI-9ZZ18	Visual Examination of Component Supports	Revision 12
5. CRDR 3236748	Cracked Weld on Main Steam Pipe Support	10/17/08

During the audit of program elements 1–6, the staff found that:

Elements 1–6 (scope of program, preventive action, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e. no previously unknown aging effects were identified by the applicant or the staff); and

The operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff issued RAI B.2.29-1 for the following subject:

NRC IN 2009-04 discusses possible age-related degradation of mechanical constant supports that may affect the supporting force provided by the constant supports and can adversely affect the analyzed stresses of connected piping systems. More information is necessary to understand how PVNGS has responded to the information provided in IN 2009-04 and how age-related degradation of constant supports is being managed.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that LRA program elements 1–6 are consistent with corresponding program elements in the GALL Report AMP;

identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

verified that the description provided in the FSAR Supplement is an adequate description of the program.

LRA AMP B2.1.30, 10 CFR Part 50, Appendix J

In the PVNGS LRA, the applicant states that AMP B2.1.30, “10 CFR Part 50, Appendix J” is an existing program that is consistent with the program elements in GALL Report AMP XI.S4, “10 CFR Part 50, Appendix J.” To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant’s staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant’s operating experience database using the keywords: “leak,” “penetration,” and “degradation.”

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.30	10 CFR Part 50, Appendix J	Revision 3 12/3/2009
2. 73DP-9CL02	Containment Leakage Rate Testing Program	Revision 27
3. 73ST-9CL02	Integrated Leak Rate Test	Revision 7
4. CRDR 34679	73ST-9X123 Failed Due to a Leak from Valve 1JCPBUV003A	8/10/1999
5. CRDR 117925	CRDR Questions the Validity of UFSAR 6.3.2.3 Regarding CIV Leak Rate Testing	5/10/2000
6. CRDR 117925 Evaluation	Purge Valve LLRT Effectiveness	
7. CRDR 3390816	Containment Isolation Valve Failed Acceptance Criteria per 73ST-9CL01	10/13/2009
8. PVAR 3392560	Palo Verde Action Request	10/17/2009
9. 31MT-9ZC03	Containment Purge Isolation Valve Disassembly and Assembly, 42" and 8"	Revision 5
10. CRDR 3395638	While performing the As Found LLRT on mechanical penetration 22 ...	10/26/2009

During the audit of program elements 1–6, the staff found that:

elements 1–6 (scope of program, preventive action, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff reviewed several applicant 'CRDRs' which demonstrated that degradation is being appropriately captured and corrected by the program, prior to the loss of intended function.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that LRA program elements 1–6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.31, Masonry Wall Program

In the PVNGS LRA, the applicant states that AMP B.2.1.31, “Masonry Wall Program” is an existing program with enhancement that is consistent with the program elements in GALL Report AMP XI.S5, “Masonry Wall Program.” To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience), and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The enhancement affects LRA program element 4 (detection of aging effects). This enhancement specifies that ACI 349.3R-96 will be used as the reference for qualification of personnel to inspect structures. In Commitment No. 33 of Table A4-1 of the LRA, the applicant committed to implement this enhancement prior to the period of extended operation.

During its audit, the staff conducted walkdowns, interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant’s operating experience database using keywords: “concrete leaching,” “concrete repair,” “steel reinforcement corrosion,” “concrete cracking,” “concrete degradation,” “loss of material,” and “masonry walls.”

The table below lists the documents that were reviewed by the staff and found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.31	Palo Verde Generating Station Program Evaluation Report B2.1.32, “Masonry Wall Program”	Rev. 3/ 12/03/2009
2. 81DP-0ZZ01	Civil System, Structure, and Component Monitoring Program	Rev.16
3. 70DP-0MR01	Maintenance Rule	Rev. 29
4. 90DP-01P10	Condition Reporting	Rev. 44
5. AC-0241	Maintenance Work Order Process and Control	Rev. 0

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program as modified by the proposed enhancement.

During the audit, the staff found that:

elements 1, 2, 3, and 5 (scope of program, preventive actions, parameters monitored/inspected, and monitoring and trending) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

sufficient information was not available to determine whether elements 4 and 6 (detection of aging effects and Acceptance Criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program elements 4 and 6 are consistent with the corresponding elements of the GALL Report AMP, the staff issued RAIs B2.1.32-1 and B2.1.32-2 for the following subjects:

In element 4 of the LRA AMP it states that inspections include system, structures, and components (SSCs) and components including masonry walls that are identified for each topical area with frequencies that provide assurance that selected SSCs will not degrade or drastically change their ability to protect or support safety systems or components. The monitoring is scheduled to result in total observation of all systems on a frequency of approximately ten years. To include a cross section of all three units, observations are conducted in different areas of different units to ensure that within a thirty-year cycle all units and all areas of each unit are monitored. In the GALL Report AMP XI.S5 it states that the primary parameter monitored or inspected is wall cracking that could potentially invalidate the evaluation basis and that masonry walls may be inspected as part of the Structures Monitoring Program (GALL XI.S6) conducted for the Maintenance Rule. Industry standards (e.g., ACI 349.3R-96) identified in the GALL Structures Monitoring Program suggest a five-year inspection frequency for structures exposed to a natural environment, structures inside primary containment, continuous fluid-exposed structures, and structures retaining fluid or pressure; and a 10-year inspection frequency for below-grade structures and structures in a controlled interior environment. It is not clear to the staff that all SSC's at each unit inspected under this AMP are in compliance with the industry standard inspection frequency (e.g., as noted in ACI 349.3R-96) or that only representative SSCs at each plant will be inspected within a 30-year period implying that SSCs at each unit are completely inspected only once during the 30-year period.

In element 6 of the LRA AMP it states that the Structures Monitoring Program, which includes the Masonry Wall Program, provides guidance for the determination of performance criteria of SSCs included within the scope of the Maintenance Rule. A component observation report is to be prepared after each inspection that considers all the individual observations in relation to the ability of the structure to provide the necessary support and protection for the SSCs included within the structure. If any areas are found to have significant aging effects, engineering notifications are made to determine appropriate corrective action. SSC deficiencies are categorized as minor, adverse, or critical. It is unclear to the staff what criteria are utilized to classify a deficiency as minor, adverse, or critical.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

During the audit, an example CRDR (2949734) addressing a circulating water blockhouse in which cinder block pillars had numerous cracks was reviewed to provide an indication that aging of masonry walls would be adequately managed during the period of extended operation. During the walkdown, two areas were identified in the equipment room of Unit 1 where cracking was evident in the masonry wall. The cracks were vertical extending about 2 to 3 feet from the floor and were relatively narrow in width (e.g., less than 1/16-inch wide). The source of the cracks was uncertain, but plant personnel indicated that the cracks were stable, not propagating or increasing in width, and the walls were reinforced. The applicant explained that the cracks were being monitored by the AMP and had not grown since they were originally identified.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore is acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1–6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 4 and 6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.32, Structures Monitoring Program

In the PVNGS LRA, the applicant states that AMP B.2.1.32, "Structures Monitoring Program" is an existing program with enhancement that is consistent with the program elements in GALL Report AMP XI.S6, "Structures Monitoring Program." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience), and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the

scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The enhancement affects LRA program element 4 (detection of aging effects). This enhancement specifies that the Structures Monitoring Program will identify ACI 349.3R-96 as the reference for qualification of personnel to inspect structures. In Commitment No. of Table A4-1 of the LRA, the applicant committed to implement this enhancement prior to the period of extended operation.

During its audit, the staff conducted walkdowns, interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant’s operating experience database using keywords: “boric acid,” “concrete leaching,” “concrete repair,” “steel reinforcement corrosion,” “concrete cracking,” “concrete degradation,” “loss of material,” “masonry walls,” “rust,” and “spent fuel pool.”

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.32	Palo Verde Generating Station Program Evaluation Report B2.1.32, “Structures Monitoring Program”	Rev. 3 12/03/2009
2. 81DP-0ZZ01	Civil System, Structure, and Component Monitoring Program	Rev. 16
3. 70DP-0MR01	Maintenance Rule	Rev. 29
4. 90DP-01P10	Condition Reporting	Rev. 44
5. AC-0241	Maintenance Work Order Process and Control	Rev. 0
6. CRDR 56465 (Legacy # 320508)	The spent fuel pool liner drain indicates that a leak has developed in the liner.	11/8/92
7. CTLGroup Project No.: 059084	October 18-20, 2005 Site Visit Examination of Spent Fuel Pool Concrete Walls in Unit 1	November 18, 2005

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program as modified by the proposed enhancement.

During the audit, the staff found that:

elements 1, 2, 3, and 5 (scope of program, preventive actions, parameters monitored/inspected, and monitoring and trending) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMPs.

sufficient information was not available to determine whether elements 4 and 6 (detection of aging effects and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program elements 4 and 6 are consistent with the corresponding elements of the GALL Report AMP, the staff issued

RAIs B2.1.32-1 and B2.1.32-2 as discussed in the section of this Audit Report titled, “LRA AMP B2.1.31, Masonry Wall Program”.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff’s independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff’s independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

During the review, a Condition Report Disposition Request (CRDR) item 56465 and 2814209 were identified indicating that leakage of the spent fuel pool water has occurred. It is unclear to the staff if these conditions are continuing and whether or not they have been appropriately dispositioned. The staff was also unsure whether or not PVNGS had experienced refueling cavity leakage; however, during the audit, the applicant explained that PVNGS has no experience with refueling cavity leakage. In addition, the staff’s independent operating experience search was unable to identify any incidents of refueling cavity leakage. The staff issued RAI B2.1.32-3 related to the spent fuel pool leakage.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore is acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1–6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 4 and 6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is not sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.35, Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

In the PVNGS LRA, the applicant states that AMP B2.1.35, “Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements” is a new program that is consistent with the program elements in GALL Report AMP XI.E6, “Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements,” and Interim Staff Guidance LR-ISG-2007-02. The applicant committed to implementing this program

prior to the period of extended operation as referenced to LRA Appendix A, Section A1.35. To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walk downs, interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant’s operating experience database using keywords: “cable,” “connection,” “bolt,” “loose,” “electrical,” “corrosion,” and “thermography.” Further, the staff performed a search of site specific operating experience for the period 2000 through October 2009. Databases were searched using various key word searches and then reviewed by technical auditor staff. Databases searched include: Generic Letters, Bulletins, Regulatory Issue Summaries, Licensee Event Reports, Event Notifications, Inspection Findings and Inspection Reports.

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. NUREG 1801	Generic Lessons Learned (GALL) Report Chapter XI, “Aging Management Programs (AMPS),” AMP XI.E5, “Fuse Holders.”	Vol. 2, Revision 1 09/2005
2. 82DP-0EE01	Electrical Aging Management	Revision 0 Date N/A
3. PVNGS-AMP-B2.1.35	Electrical Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Revision 3 Date N/A
4. XI.E6 WO OE	PVNGS License Renewal Aging Management Work Order Operating Experience Report for AMP XI.E6	Revision N/A Date N/A
5. XI.E6 CRDR OE	PVNGS License Renewal Aging Management CRDR Operating Experience Report for AMP XI.E6	Revision N/A Date N/A
6. 37TI-9ZZ01	Infrared Thermography Inspection of Plant Components	Revision 4 Date N/A

During the audit of program elements 1–6, the staff found that:

elements 2, 5, and 6 (preventive actions, monitoring and trending, acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether elements 1, 3, and 4 (scope of program, parameters monitored/inspected, detection of aging effects) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program elements 1, 3, and 4 are consistent with the corresponding elements of the GALL Report AMP, the staff will consider issuing an RAI for the following subject:

LRA Section B2.1.35 and the associated UFSAR supplement (A1.35) are not consistent with the GALL AMP XI.E6 or NUREG -1801, Vol. 2 Revision 1. However, LRA Section B2.1.35 is representative of the summary description and program elements of staff ISG (ISG-LR-ISG-2007-02) issued for public comment by letter dated August 29, 2007 (ADAMS ML072420437), but not yet issued for use. Justification has not been provided as to the acceptability of the proposed ISG-LR-ISG-2007-02 with respect to GALL AMP XI.E6.

Subsequent to the audit, a notice of availability of the final ISG LR ISG-2007-02 was published in the Federal Register on December 23, 2009; therefore the RAI was not issued. The staff will re-evaluate this issue and address its findings in the SER.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience identified by the staff's independent database searches and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience identified by the staff's independent database searches and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP.

In order to obtain the information necessary to verify the sufficiency of the UFSAR Supplement program description, the staff will consider issuing RAI for the following subject:

LRA Section B2.1.35 and the associated UFSAR supplement (A1.35) are not consistent with the GALL AMP XI.E6 or NUREG -1801, Vol. 2 Revision 1. However, LRA Section B2.1.35 is representative of the summary description and program elements of staff ISG (ISG-LR-ISG-2007-02) issued for public comment by letter dated August 29, 2007 (ADAMS ML072420437), but not yet issued for use. Justification has not been provided as to the acceptability of the proposed ISG-LR-ISG-2007-02 with respect to GALL AMP XI.E6.

Subsequent to the audit, a notice of availability of the final ISG LR ISG-2007-02 was published in the Federal Register on December 23, 2009; therefore the RAI was not issued. The staff will re-evaluate this issue and address its findings in the SER.

Based on this audit the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B2.1.36, Metal Enclosed Bus Program

In the PVNGS LRA, the applicant states that AMP B.2.1.36, “Metal Enclosed Bus” is a new program that is consistent with the program elements in GALL Report AMP XI.E4, “Metal Enclosed Bus.” The applicant committed to implementing this program prior to the period of extended operation in Commitment No. 38 of Table A4-1. To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the FSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted a walk down, interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant’s operating experience database using keywords: “bus,” “metal,” “connections,” “duct,” and “phase.”

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B2.1.36	Aging Management Program for Metal Enclosed Bus	Rev. 4
2. 82DP-0EE01	Electrical Aging Management	Rev. 0
3. PVARs/CRDRS	Operating Experience Summary Report	12/2/09
4. TR-11PV	Electrical Component Aging Evaluation License Renewal Technical Report Palo Verde Nuclear Generating Station	Rev. 0

During the license renewal AMP audit walkdown, the staff noticed a crack in the non-segregated bus bellow connecting the engineered safeguard feature service transformer. The crack was appropriately 4 inches long and could be seen by inspection from the sidewalk in front of the

transformer. Cracks in the bellows could allow moisture to enter and degrade connections from bus to transformer. The applicant created Palo Verde Action Request (PVAR) number 3413455 to recommend corrective maintenance to rework the bellow.

During the audit of program elements 1–6 , the staff found that:

elements 1, 2, 3, 4, and 5 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, and monitoring and trending) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

sufficient information was not available to determine whether element 6 (acceptance criteria) of the AMP was consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element 6 is consistent with the corresponding elements of the GALL Report AMP, the staff issued RAI B2.1.36-1 for the following subjects:

The GALL Report uses XI.S6, Structure Monitoring Program, for inspecting the exterior of metal enclosed buses (MEBs) and accessible gaskets and sealants associated with the exterior of MEBs. In the GALL Report XI.S6, under acceptance criteria, it states that for each structure/aging effect combination, the acceptance criteria are selected to ensure that the need for corrective actions will be identified before a loss of intended functions. Under program attribute 6 (acceptance criteria), the applicant did not specify the acceptance criteria for inspecting the exterior of MEBs including gaskets and sealants.

During the audit of program element 10 (Operating Experience), the staff found that:

the operating experience identified by the staff's independent data base search and supplemented by the applicant is bounded by industry operating experience (i.e. no previously unknown aging effects were identified by the applicant or the staff);

the operating experience identified by the staff's independent data base search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the FSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1 - 6 are consistent with corresponding program elements in the GALL Report AMP while identifying certain aspects of LRA program elements 1-6 for which additional information is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the FSAR Supplement is an adequate description of the program.

LRA AMP B2.1.37, Fuse Holders

In the PVNGS LRA, the applicant states that AMP B2.1.37, “Fuse Holders” is a new program that is consistent with the program elements in GALL Report AMP XI.E5, “Fuse Holder.” The applicant committed to implementing this program prior to the period of extended operation in Commitment No. 50 of Table A4-1, “License Renewal Commitments. To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant’s operating experience databases using keywords: “fuse,” “fuse holder,” “corrosion,” “oxidation,” “block,” and “contamination.” Further, the staff reviewed operating experience for the period 2000 through October 2009 using various key word searches. Additional databases searched included Generic Letters, Bulletins, Regulatory Issue Summaries, License Event Reports, Event Notifications, Inspection Findings, and Inspection Reports.

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. NUREG 1801	Generic Lessons Learned (GALL) Report Chapter XI, “Aging Management Programs (AMPS),” AMP XI.E5, “Fuse Holders.”	Vol. 2, Revision 1 09/2005
2. Operating Experience Report	PVNGS License Renewal Aging Management Industry Operating Experience Report For AMP XI.E5, “Fuse Holders”	Revision N/A Date N/A
3. Operating Experience Report	Palo Verde Nuclear Generating Station Operating Experience Summary Report XI.E5, “Fuse Holders”	Revision N/A Date N/A
4. 82DP-0EE01	Electrical Aging Management	Revision 0 Date N/A
5. PVNGS-AMP-B2.1.37	Aging Management for Fuse Holders	Revision 0 Date N/A

During the audit of program elements 1–6 , the staff found that:

elements 1–6 (scope of program, preventive action, parameters monitored/inspected, detection of aging effects, monitoring and trending, and acceptance criteria) were consistent with the corresponding elements of the GALL Report AMP XI.E5;

During the audit of program element 10 (operating experience), the staff found that:

the operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience identified by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that LRA program elements 1–6 are consistent with corresponding program elements in the GALL Report;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B3.1, Metal Fatigue of Reactor Coolant Pressure Boundary Program

In the PVNGS LRA, the applicant states that AMP B3.1, "Metal Fatigue of Reactor Coolant Pressure Boundary Program" is an existing program with enhancements that is consistent with the program elements in GALL Report AMP X.M1, "Metal Fatigue of Reactor Coolant Pressure Boundary Program." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement described in LRA Section A2.1, "Metal Fatigue of Reactor Coolant Pressure Boundary." Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program element 1 (scope of program). This enhancement expands on the existing program element by adding (i) additional ASME Code Class 1 locations

with high calculated cumulative usage factors, (ii) ASME Code Class 1 components for which transfer functions have been developed for stress-based monitoring, and (iii) ASME Code Class 2 portions of the steam generator with ASME Code Class 1 analysis and high calculated cumulative usage factors.

The second enhancement affects LRA program elements 2, 6 and 7 (preventive actions, acceptance criteria and corrective actions). This enhancement expands on the existing program element by adding additional cycle count and fatigue usage action limits, with corrective actions to be invoked if a component approaches a cycle count action limit or fatigue usage action limit; action limits permit completion of corrective actions before the design limits are exceeded.

The third enhancement affects LRA program elements 3 and 5 (parameters monitors or inspected and monitoring and trending). This enhancement expands on the existing program element by adding a revised list of monitored plant transients that contribute to high usage factor, and a revised list of monitored locations in ASME Code Class 1 piping and vessels and in parts of the Class 2 steam generators that have a Class 1 analysis.

In Commitment No. 39 of Table A4-1 of the LRA, the applicant committed to implement enhancements one and two prior to the period of extended operation. The staff issued an RAI, described later in this report, questioning when the third enhancement will be implemented.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "metal fatigue."

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B.1	Metal Fatigue of Reactor Coolant Pressure Boundary	Revision 2 12/4/2009
2. 73ST-9RC02	Reactor Coolant System Transient and Operational Cycles	Revision 8 12/11/2009
3. 65DP-0QQ01	Industry Operating Experience Review	Revision 20 12/11/2009
4. PV-30Q-304	Charging Nozzle Fatigue Usage Analysis	Revision 0 7/09/2008
5. PV-30Q-305	Environmentally Assisted Fatigue (EAF) Analysis of the Charging Nozzle	Revision 0 5/30/2008
6. PV-30Q-314	Surge Line Hot Leg Elbow Fatigue Usage Analysis	Revision 0 9/14/2008
7. PV-30Q-315	Environmentally Assisted Fatigue (EAF) Analysis of the Surge Line Elbow	Revision 0 9/14/2008
8. PV-30Q-316	Shutdown Cooling Elbow Environmentally-Assisted Fatigue Calculation for Palo Verde	Revision 1 7/29/2008
9. PV-30Q-317	Fatigue Usage Evaluation of Charging Nozzles, Safety Injection Nozzles and Surge Line Hot Leg Elbow Using Assumed Plant Cycles	Revision 0 4/16/2009
10. PV-30Q-318	Environmentally Assisted Fatigue (EAF) Analysis of Charging Nozzles, Safety Injection Nozzles and Surge Line Hot Leg Elbow Using Assumed Plant Cycles	Revision 0 4/17/2009
11. PV-21Q-313	Environmentally Assisted Fatigue (EAF) Analysis	Revision 0 7/18/2008

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit of program elements 1–6 , the staff found that:

element 4 (detection of aging effects) of the LRA AMP was consistent with the corresponding elements of the GALL Report AMP;

element 1 (scope of program) of the LRA AMP was not strictly consistent with the corresponding elements of the GALL Report AMP but that sufficient information was available to allow the staff to determine that this element of the LRA AMP are equivalent to the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether elements 2, 3, 5 and 6 (preventive actions, parameters monitored or inspected, monitoring and trending, and Acceptance Criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

The basis for the staff’s determination that element 1 (scope of program) of the LRA AMP are equivalent to the corresponding GALL Report AMP is:

this element will be enhanced to add additional Class 1 locations and some locations in Class 2 portions of the steam generated with a Class 1 analysis.

In order to obtain the information necessary to verify whether the LRA program element numbers 2, 3, 5, and 6 are consistent with the corresponding elements of the GALL Report AMP, the staff issued RAIs B3.1-1 through B3.1-8 for the following subjects:

In element 2 of the LRA AMP, it states that the program will be enhanced with additional cycle count and fatigue usage action limit. In the GALL Report AMP it states that maintaining the fatigue usage factor below the design code limit will provide adequate margin against fatigue cracking of reactor coolant system components due to anticipated cyclic strains. It is not clear to the staff that these statements are consistent because the applicant does not provide information on what additional cycle count and fatigue usage action limit will be included as enhancements to the program.

In element 3 of the LRA AMP, it states that the program will be enhanced to include a revised list of monitored plant transients that contribute to high usage factor. In the GALL Report AMP it states that the program monitors all plant transients that cause cyclic strains, which are significant contributors to the fatigue usage factor. It is not clear to the staff that these statements are consistent because this enhancement is not described in Commitment No. 39 of LRA Table A4-1.

In element 5 of the LRA AMP, it states that the locations in which fatigue effects are controlled by a simple comparison counting method are those with relatively low design fatigue usage values. In the GALL Report AMP it states that the program monitors a sample of high fatigue usage locations. It is not clear to the staff that these statements are consistent because the applicant does not provide information on which locations have been selected for a simple comparison counting method, how these locations were selected, and what criteria were used to classify fatigue usage values as relatively low fatigue usage values.

In element 6 of the LRA AMP, it states that the program acceptance criteria will be enhanced with other limits as the basis for safety determination. In the GALL Report AMP it states that the acceptance criteria involve maintaining the fatigue usage below the design code limit considering environmental fatigue effects as described under the program description. It is not clear to the staff that these statements are consistent because the applicant did not provide a description of these other limits.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff issued RAI B3.1-3 for the following subject:

the methods of the FatiguePro[®] software that utilizes a Green's transfer function to calculate the fatigue effects of transient cycles will be used by the enhanced PVNGS Fatigue Management Program; however, the applicant did not provide information how NRC RIS 2008-30 was considered in the development of the PVNGS Fatigue Management Program and how the results of this review were incorporated into the enhanced PVNGS Fatigue Management Program.

The staff also audited the description of the LRA AMP provided in UFSAR Supplement described in LRA Section A2.1, "Metal Fatigue of Reactor Coolant Pressure Boundary." The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1–6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1–6 for which additional information or additional evaluation is required before consistency can be determined;

identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B3.2, Environmental Qualification (EQ) of Electrical Component

In the PVNGS LRA, the applicant states that AMP B3.2, "Environmental Qualification (EQ) of Electrical Components" is an existing program that is consistent with the program elements in GALL Report AMP X.E1, "Environmental Qualification (EQ) of Electrical Components." To verify this claim of consistency the staff audited the LRA AMP. This audit report considers program elements 1–6 (Scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walk downs, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "EQ," "qualification," "environmental," "electrical," "cable," "component," "connection," "termination." Further, the staff performed a search of operating experience for the period 2000 through

October 2009. Databases were searched using various key word searches and then reviewed by technical auditor staff. Databases searched include: Generic Letters, Bulletins, Regulatory Issue Summaries, Licensee Event Reports, Event Notifications, Inspection Findings, and Inspection Reports.

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. PVNGS-AMP-B3.2	Environmental Qualification (EQ) of Electrical Components – B3.2	Revision 3 Date 12/2/2009
2. X.E1 OE Summary Report	Palo Verde Nuclear Generating Station Operating Experience Summary Report – X.E1, "Environmental Qualification (EQ) of Electrical Components."	Revision N/A Date N/A
3. X.E1 Aging Management Industry OE Report	PVNGS License Renewal Aging Management Industry Experience Report for AMP X.E1, Environmental Qualification (EQ) of Electrical Components" B3.2	Revision N/A Date N/A
4. 65DP-0QQ01	Industry Operating Experience Review	Revision 24 Date N/A
5. 93DP-0LC05	Regulatory Interaction and Correspondence Control	Revision 16 Date N/A
6. 81TD 0EQ01	Temperature Monitoring Program	Revision 2 Date 8/12/2009
7. 88DP-4EQ03	Equipment Qualification Data File	Revision 7 Date N/A
8. 88DP-4EQ04	Equipment Qualification Impact Assessment	Revision 10 Date N/A
9. EQDF-EQ-PM	EQUIPMENT Qualification Program Manual	Revision 17 Date N/A
10. NUREG 1801	Generic Lessons Learned (GALL) Report Chapter X, "Time-Limited Aging Analysis Evaluation of Aging Management Programs Under 10 CFR 54.21(c)(1)(iii)," AMP X.E1, "Environmental Qualification of Electric Components."	Vol. 2, Revision 1 09/2005
11. Regulatory Guide 1.89	Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants	Revision 1 11/20/2008
12. TR-4PV	Environmental Qualification (EQ) License Renewal Position Paper	Revision 0 5/5/2006
13. SWMS 3161971	Environmental Qualification of Electrical Equipment Program Focused Self Assessment Report	Revision N/A Date 6/25/2008
14. SWMS 2957427	Palo Verde Nuclear Generating Station Focused Self Assessment Equipment Qualification Program SWMS Self Assessment No. 2957427	Revision N/A Date 6/29/2007
15. SWMS 3151987	PVNGS Benchmark Environmental Qualification of Electrical Equipment	Revision N/A Date 7/9/2008

During the audit of program elements 1–6, the staff found that:

elements 1 through 6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database searches is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database searches is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP.

In order to obtain the information necessary to verify the sufficiency of the UFSAR Supplement program description, the staff issued RAIs B3.2-1 and B4.4-1 for the following subjects:

The applicant's UFSAR supplements included in LRA Appendix A, Section A3.3, "Environmental Qualification (EQ) of Electrical Components" and Section A2.2, "Environmental Qualification (EQ) of Electrical Components," do not include reanalysis attributes as shown in LRA Appendix B, Section B3.2, LRA Chapter 4, Section 4.4, GALL AMP X.E1 and SRP-LR Table 4.4.2.

Table A4-1, "License Renewal Commitments," of the LRA Commitment No. 40 is inconsistent with the applicant's license renewal commitments for existing programs in that although the existing EQ program is considered an aging management program, the commitment does not credit it for license renewal. The applicant's commitment requires that existing EQ evaluations be re-evaluated prior to the period of extended operation and not as an ongoing program consistent with the applicant's Table A4-1 for existing programs.

Based on this audit the staff:

verified that LRA program elements 1–6 are consistent with corresponding program elements in the GALL Report;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B3.3, Concrete Containment Tendon Prestress

In the PVNGS LRA, the applicant states that AMP B3.3, "Concrete Containment Tendon Prestress" is an existing program with enhancements that is consistent with the program elements in GALL Report, Section X.S1, "Concrete Containment Prestress." To verify this claim

of consistency, the staff audited the LRA AMP. This audit report considers program elements 1–6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and program element 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The two enhancements affect LRA program elements 5 and 6 (monitoring and trending, and acceptance criteria). These enhancements expand on the existing program elements 5 and 6, and will require an update of the plant procedures for the regression analysis methods, including the use of individual tendon data in accordance with IN 99-10, "Degradation of Prestressing Tendon Systems in Prestressed Concrete Containments."

In Commitment No. 41 of Table A4-1, the applicant committed to implement these enhancements prior to the period of extended operation.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "tendon," "prestress," and "containment prestress."

The table below lists the documents, which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. Calculation 13-CC-ZC-0061, Appendix G	Tendon Prestress Regression Analysis for Extended Operation	Revision 13
2. 73ST-1ZC01	Tendon Integrity	Revision 10
3. CRDR 95716	CRDR Requests a Review of IN 99-10 Relative to Problems with Tendon Systems	05/05/1999

The staff conducted its audit of LRA program elements 1–6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

elements 1, 2, 3, 4 (scope of program, preventive actions, parameters monitored, detection of adding effects) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

elements 5 and 6 (monitoring and trending, acceptance criteria) of the LRA AMP were not strictly consistent with the corresponding elements of the GALL Report AMP but that sufficient information was available to allow the staff to determine that these elements of the LRA AMP are equivalent to the corresponding elements of the GALL Report AMP.

The basis for the staff's determination that elements elements 5 and 6 (monitoring and trending, acceptance criteria) of the LRA AMP are equivalent to the corresponding GALL Report AMP is:

The applicant has committed to enhance AMP program elements 5 and 6. These enhancements expand on the existing program elements 5 and 6, and will require an update of the plant procedures for the regression analysis methods, including the use of individual tendon data in accordance with IN 99-10, "Degradation of Prestressing Tendon Systems in Prestressed Concrete Containments." These enhancements are acceptable because the program description section of GALL AMP X.S1 recommends the use of IN 99-10 for constructing the trend lines (regression analysis).

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff issued RAI B3.3-1 for the following subject:

PVNGS LRA AMP B3.3, element 5 states that the Concrete Containment Tendon Prestress Program documents will be enhanced to require a regression analysis for each tendon group after every surveillance. PVNGS performed tendon surveillance for Units 1, 2, and 3 during 2008, 2006, and 2002, respectively. However, according to PVNGS AMP B3.3, element 5, the Containment Tendon Prestress Program documents have not been revised until now. Therefore, the applicant will be requested to provide status and conclusions of the regression analysis performed in accordance with IN 99-10.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR, and therefore, acceptable.

Based on this audit the staff:

verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

Applicant Personnel Participating in the Aging Management Program Audit

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