



A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear
Generating Station

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102-06224-JHH/GAM
July 21, 2010

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528, 50-529 and 50-530
Updated License Renewal Application Commitment List, and License
Renewal Application Amendment No. 20**

By letter no. 102-05937, dated December 11, 2008, as supplemented by letter no. 102-05989, dated April 14, 2009, Arizona Public Service Company (APS) submitted a license renewal application (LRA) for PVNGS Units 1, 2, and 3.

An updated LRA Table A4-1, License Renewal Commitments, is provided in Enclosure 1, LRA Amendment No. 20 Clean Pages, and Enclosure 2, LRA Amendment No. 20 Markup Pages. The Table A4-1 list of license renewal commitments has been updated to (1) incorporate editorial enhancements, (2) delete the commitments that have been described in previous submittals as being completed, and (3) delete the commitments for subsequently completed enhancements for the following programs:

- Quality Assurance Program (Commitment No. 2, LRA A1 and B1.3)
- Fire Protection Program (Commitment No. 14, LRA A1.12 and B2.1.12)

In addition, the following commitments are being revised:

- Commitment No. 14 in Table A4-1 for the fire protection program (LRA A1.12 and B2.1.12) has been revised to state that prior to the period of extended operation, procedures will be enhanced to perform the testing of the Electro-Thermal Links and functional testing of the halon and CO₂ dampers every 18 months or at the frequency specified in the current licensing basis in effect upon entry into the period of extended operation.

A member of the **STARS** (Strategic Teaming and Resource Sharing) Alliance

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- Commitment No. 20 in Table A4-1 for the buried piping and tanks program (LRA A1.18 and B2.1.18) has been expanded to include additional commitments that will strengthen the buried piping and tanks program.

Corresponding updates to the LRA Appendix A and Appendix B sections for these programs are provided in LRA Amendment 20 in Enclosures 1 and 2.

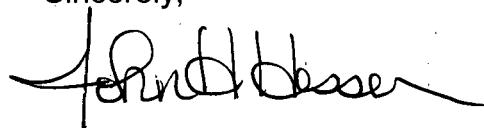
An enhancement to LRA Section 3.3.2.2.4.1 for stainless steel non-regenerative heat exchanger components is also provided in LRA Amendment 20 in Enclosures 1 and 2.

Should you need further information regarding this submittal, please contact Russell A. Stroud, Licensing Section Leader, at (623) 393-5111.

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

Executed on 7/21/10
(date)

Sincerely,



JHH/RAS/GAM

Enclosures:

1. Palo Verde Nuclear Generating Station License Renewal Application Amendment No. 20 – Clean Pages
2. Palo Verde Nuclear Generating Station License Renewal Application Amendment No. 20 – Markup Pages

cc: E. E. Collins Jr. NRC Region IV Regional Administrator
J. R. Hall NRC NRR Senior Project Manager
L. K. Gibson NRC NRR Project Manager
R. I. Treadway NRC Senior Resident Inspector for PVNGS
L. M. Regner NRC License Renewal Project Manager
G. A. Pick NRC Region IV (electronic)

ENCLOSURE 1

Palo Verde Nuclear Generating Station License Renewal Application Amendment No. 20 – Clean Pages

LRA Section	Page Nos.
3.3.2.2.4.1	3.3-36
A1*	A-2
A1.12*	A-6
A1.18*	A-11, 11A
Table A4-1	A-42 thru A-59
B1.3*	B-2, 3
B2.1.12*	B-45, 46, 47
B2.1.18*	B-60, 61, 61A

- * The complete Appendix A and B aging management program sections are provided for reviewer convenience when there is any change to the sections.

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Source: RAI Non-regenerative Heat Exchanger (LRA 3.3.2.2.4.1) Response

LRA 3.3.2.2, Further Evaluation of Aging Management as Recommended by NUREG-1801, Section 3.3.2.2.4.1, Stainless Steel PWR non-regenerative heat exchanger components exposed to borated water, page 3.3-36, is revised as shown below.

3.3.2.2.4 Cracking due to Stress Corrosion Cracking and Cyclic Loading

- 3.3.2.2.4.1 Stainless steel PWR non-regenerative heat exchanger components exposed to borated water

The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) will manage cracking due to stress corrosion cracking and cyclic loading for the stainless steel CVCS letdown (non-regenerative) heat exchanger components exposed to treated borated water. Temperature and radioactivity of the shell-side water are monitored by installed instrumentation. The One-Time Inspection program (B2.1.16) will select heat exchanger tubes with similar materials and environment, including fluid temperatures, to those of the CVCS letdown (non-regenerative) heat exchanger with consideration for temperatures above the threshold of cracking for stainless steel. The One-Time Inspection program (B2.1.16) will perform eddy-current testing of stainless steel heat exchanger tubes in a borated water environment that is above the threshold temperature for cracking of stainless steel.

A1 SUMMARY DESCRIPTIONS OF AGING MANAGEMENT PROGRAMS

The integrated plant assessment and evaluation of time-limited aging analyses (TLAA) identified existing and new aging management programs necessary to provide reasonable assurance that components within the scope of License Renewal will continue to perform their intended functions consistent with the current licensing basis (CLB) for the period of extended operation. Sections A1 and A2 describe the programs and their implementation activities.

Three elements common to all aging management programs discussed in Sections A1 and A2 are corrective actions, confirmation process, and administrative controls. These elements are included in the PVNGS Quality Assurance (QA) Program, which implements the requirements of 10 CFR 50, Appendix B. The PVNGS Quality Assurance Program is applicable to all safety-related and nonsafety-related systems, structures and components that are subject to aging management review activities.

A1.12 FIRE PROTECTION

The Fire Protection program manages loss of material for fire rated doors, fire dampers, diesel-driven fire pumps, and the halon/CO₂ fire suppression systems, cracking, spalling, and loss of material for fire barrier walls, ceilings, and floors, and hardness and shrinkage due to weathering of fire barrier penetration seals. Periodic visual inspections of fire barrier penetration seals, fire dampers, fire barrier walls, ceilings and floors, and periodic visual inspections and functional tests of fire-rated doors manage aging. Periodic testing of the diesel-driven fire pumps ensures that there is no loss of function due to aging of diesel fuel supply lines. Drop tests are performed on 10 percent of fire dampers on an 18 month basis to manage aging. Visual inspections manage aging of fire-rated doors every 18 months to verify the integrity of door surfaces and for clearances to detect aging of the fire doors. A visual inspection and function test of the halon and CO₂ fire suppression systems every 18 months (along with the destructive testing of the Electro-Thermal Links (ETLs) and functional testing of the dampers which are both performed every 54 months) manages aging. Ten percent of each type of penetration seal is visually inspected at least once every 18 months. Fire barrier walls, ceilings, and floors including coatings and wraps are visually inspected at least once every 18 months.

Prior to the period of extended operation procedures will be enhanced to perform the testing of the Electro-Thermal Links (ETLs) and functional testing of the halon and CO₂ dampers every 18 months or at the frequency specified in the current licensing basis in effect upon entry into the period of extended operation.

A1.18 BURIED PIPING AND TANKS INSPECTION

The Buried Piping and Tanks Inspection program manages loss of material of buried components in the chemical and volume control, condensate storage and transfer, diesel fuel storage and transfer, domestic water, fire protection, SBOG fuel system, service gas and essential spray ponds systems. Visual inspections monitor the condition of protective coatings and wrappings found on carbon steel, gray cast iron or ductile iron components and assess the condition of stainless steel components with no protective coatings or wraps. The program includes opportunistic inspection of buried piping and tanks as they are excavated or on a planned basis if opportunistic inspections have not occurred.

The Buried Piping and Tanks Inspection program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

Within the ten year period prior to entering the period of extended operation an opportunistic or planned inspection of buried tanks at the Palo Verde site will be performed.

The visual inspections noted below of piping in a soil environment within the scope of license renewal will be conducted within the ten-year period prior to entering the period of extended operation, and during each ten year period after entering the period of extended operation. Each inspection will:

- select accessible locations where degradation is expected to be high;
 - excavate and visually inspect the circumference of the pipe; and
 - examine at least ten feet of pipe.
- a. Metallic Piping not Cathodically-Protected

At least two excavations and visual inspections of stainless steel piping will be conducted in each unit. Stainless steel piping within the scope of license renewal exists in the following systems:

- Chemical and Volume Control (CH),
- Condensate Transfer and Storage (CT), and
- Fire Protection (FP).

b. Steel Piping Cathodically-Protected

At least two excavations and visual inspections of cathodically-protected steel piping will be conducted in each unit.

c. Steel Piping with Potentially Degraded Cathodic Protection

At least three excavations and visual inspections of fire protection steel piping with potentially degraded bonding straps will be conducted at the Palo Verde site.

Prior to the period of extended operation, the Buried Piping and Tanks Inspection program will include provisions to (1) ensure electrical power is maintained to the cathodic protection system for in-scope buried piping at least 90% of the time (e.g., monthly verification that the power supply circuit breakers are closed or other verification that power is being provided to the system), and (2) ensure that the National Association of Corrosion Engineers (NACE) cathodic protection system surveys are performed at least annually.

Appendix A
Updated Final Safety Analysis Report Supplement

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
1	The summary descriptions of aging management programs, time-limited aging analyses, and license renewal commitments contained in LRA Appendix A, "Updated Final Safety Analysis Supplement," as required by 10 CFR 54.21(d), will be incorporated in the Updated Final Safety Analysis Report for PVNGS Units 1, 2, and 3 in the next update required by 10 CFR 50.71(e) following the issuance of the renewed operating licenses. (RCTSAI 3247244)	A0	The next 10 CFR 50.71(e) UFSAR update following issuance of the renewed operating licenses.
2	Existing Quality Assurance Program is credited for license renewal. (RCTSAI 3246887)	A1 B1.3 Summary Descriptions Of Aging Management	Ongoing
3	Existing ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program is credited for license renewal. (RCTSAI 3246890)	A1.1 B2.1.1 ASME Section XI Inservice Inspection, Subsections IWB, IWC, AND IWD	Ongoing
4	Existing Water Chemistry program is credited for license renewal. (RCTSAI 3246891).	A1.2 B2.1.2 Water Chemistry	Ongoing
5	Existing Reactor Head Closure Studs program is credited for license renewal. (RCTSAI 3246892)	A1.3 B2.1.3 Reactor Head Closure Studs	Ongoing
6	Existing Boric Acid Corrosion program is credited for license renewal. (RCTSAI 3246893)	A1.4 B2.1.4 Boric Acid Corrosion	Ongoing

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
7	Existing Nickel-Alloy Penetration Nozzles Welded to The Upper Reactor Vessel Closure Heads of Pressurized Water Reactors program is credited for license renewal. (RCTSAI 3246894)	A1.5 B2.1.5 Nickel-Alloy Penetration Nozzles Welded to The Upper Reactor Vessel Closure Heads of Pressurized Water Reactors	Ongoing
8	Existing Flow-Accelerated Corrosion program is credited for license renewal. (RCTSAI 3246895)	A1.6 B2.1.6 Flow-Accelerated Corrosion	Ongoing
9	Existing Bolting Integrity program is credited for license renewal. (RCTSAI 3246896)	A1.7 B2.1.7 Bolting Integrity	Ongoing
10	Existing Steam Generator Tube Integrity program is credited for license renewal: (RCTSAI 3246897)	A1.8 B2.1.8 Steam Generator Tube Integrity	Ongoing
11	Existing Open-Cycle Cooling Water System program is credited for license renewal, AND Prior to the period of extended operation, the program will be enhanced to clarify guidance in the conduct of piping inspections using NDE techniques and related acceptance criteria. (RCTSAI 3246898)	A1.9 B2.1.9 Open-Cycle Cooling Water System	Prior to the period of extended operation ¹

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
12	<p>Existing Closed-Cycle Cooling Water System program is credited for license renewal, AND</p> <p>Prior to the period of extended operation, procedures will be enhanced to incorporate the guidance of EPRI TR-107396 with respect to water chemistry control for frequency of sampling and analysis, normal operating limits, action level concentrations, and times for implementing corrective actions upon attainment of action levels.</p> <p>(RCTSAI 3246899)</p>	A1.10 B2.1.10 Closed-Cycle Cooling Water System	Prior to the period of extended operation ¹ .
13	<p>Existing Inspection Of Overhead Heavy Load And Light Load (Related To Refueling) Handling Systems program is credited for license renewal, AND</p> <p>Prior to the period of extended operation, procedures will be enhanced to inspect for loss of material due to corrosion or rail wear.</p> <p>(RCTSAI 3246900)</p>	A1.11 B2.1.11 Inspection Of Overhead Heavy Load And Light Load (Related To Refueling) Handling Systems	Prior to the period of extended operation ¹ .
14	<p>Existing Fire Protection program is credited for license renewal, AND</p> <p>Prior to the period of extended operation procedures will be enhanced to perform the testing of the Electro-Thermal Links (ETLs) and functional testing of the halon and CO₂ dampers every 18 months or at the frequency specified in the current licensing basis in effect upon entry into the period of extended operation.</p> <p>(RCTSAI 3246901)</p>	A1.12 B2.1.12 Fire Protection	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
15	<p>Existing Fire Water System program is credited for license renewal, AND Prior to the period of extended operation, the following enhancements will be implemented:</p> <ul style="list-style-type: none"> • Specific procedures will be enhanced to include review and approval requirements under the Nuclear Administrative Technical Manual (NATM). • Procedures will be enhanced to be consistent with the current code of record or NFPA 25 2002 Edition. • Procedures will be enhanced to field service test 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. • Procedures will be enhanced to be consistent with NFPA 25 Section 7.3.2.1, 7.3.2.2, 7.3.2.3, and 7.3.2.4. (RCTSAI 3246902) 	A1.13 B2.1.13 Fire Water System	Prior to the period of extended operation ¹ .
16	<p>Existing Fuel Oil Chemistry program is credited for license renewal, AND Prior to the period of extended operation:</p> <ul style="list-style-type: none"> • Procedures will be enhanced to extend the scope of the program to include the SBOG fuel oil storage tank and SBOG skid fuel tanks. • Procedures will be enhanced to include ten-year periodic draining, cleaning, and inspections on the diesel-driven fire pump day tanks, the SBOG fuel oil storage tank, and SBOG skid fuel tanks. • Ultrasonic testing (UT) or pulsed eddy current (PEC) thickness examination will be conducted to detect corrosion-related wall thinning if degradation is found during the visual inspections and once on the tank bottoms for the EDG fuel oil storage tanks, EDG fuel oil day tanks, diesel-driven fire pump day tanks, SBOG fuel oil storage tank, and SBOG skid fuel tanks. The onetime UT or PEC examination on the tank bottoms will be performed before the period of extended operation. (RCTSAI 3246903) 	A1.14 B2.1.14 Fuel Oil Chemistry	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
17	<p>Existing Reactor Vessel Surveillance program is credited for license renewal, AND</p> <p>Prior to the period of extended operation:</p> <ul style="list-style-type: none"> • The schedule will be revised to withdraw the next capsule at the equivalent clad-base metal exposure of approximately 54 EFPY expected for the 60-year period of operation, and to withdraw remaining standby capsules at equivalent clad-base metal exposures not exceeding the 72 EFPY expected for a possible 80-year second period of extended operation. This withdrawal schedule is in accordance with NUREG-1801, Section XI.M31, item 6, and with the ASTM E 185-82 criterion which states that capsules may be removed when the capsule neutron fluence is between one and two times the limiting fluence calculated for the vessel at the end of expected life. This schedule change must be approved by the NRC, as required by 10 CFR 50 Appendix H. • If left in the reactor beyond the presently-scheduled withdrawal, the next scheduled surveillance capsule in each unit will reach a clad-base metal 54 EFPY equivalent at about 40 actual operating EFPY (40, 39, and 42 actual EFPY in Units 1, 2, and 3, respectively). • Procedures will be enhanced to identify the withdrawal of the remaining standby capsules at 72 EFPY, at about 50 to 54 actual operating EFPY, near the end of the extended licensed operating period. The need to monitor vessel fluence following removal of the remaining standby capsules, and ex-vessel or in-vessel methods, will be addressed prior to removing the remaining capsules. <p>(RCTSAI 3246904)</p>	A1.15 B2.1.15 Reactor Vessel Surveillance	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
18	The One-Time Inspection program conducts one-time inspections of plant system piping and components to verify the effectiveness of the Water Chemistry program (A1.2), Fuel Oil Chemistry program (A1.14), and Lubricating Oil Analysis program (A1.23). The aging effects to be evaluated by the One-Time Inspection program are loss of material, cracking, and reduction of heat transfer. (RCTSAs 3246906 [U1]; 3247258 [U2]; 3247259 [U3])	A1.16 B2.1.16 One-Time Inspection	Within the ten year period prior to the period of extended operation ¹ .
19	The Selective Leaching of Materials program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAs 3246908 [U1]; 3247260 [U2]; 3247261 [U3])	A1.17 B2.1.17 Selective Leaching Of Materials	Within the ten year period prior to the period of extended operation ¹ .
20	<p>The Buried Piping and Tanks Inspection program is a new program that will be implemented prior to the period of extended operation.</p> <p>Within the ten year period prior to entering the period of extended operation an opportunistic or planned inspection of buried tanks at the Palo Verde site will be performed.</p> <p>The visual inspections noted below of piping in a soil environment within the scope of license renewal will be conducted within the ten-year period prior to entering the period of extended operation, and during each ten year period after entering the period of extended operation. Each inspection will:</p> <ul style="list-style-type: none"> • select accessible locations where degradation is expected to be high; • excavate and visually inspect the circumference of the pipe; and • examine at least ten feet of pipe. <p>a. Metallic Piping not Cathodically-Protected</p>	A1.18 B2.1.18 Buried Piping And Tanks Inspection	<p>Perform the buried piping and tanks inspections within the ten year period prior to the period of extended operation¹.</p> <p>AND</p> <p>Perform the buried piping inspections during each ten year period after entering the period of extended operation.</p> <p>AND</p> <p>Implement the additional</p>

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
	<p>At least two excavations and visual inspections of stainless steel piping will be conducted in each unit. Stainless steel piping within the scope of license renewal exists in the following systems:</p> <ul style="list-style-type: none"> o Chemical and Volume Control (CH), o Condensate Transfer and Storage (CT), and o Fire Protection (FP). <p>b. Steel Piping Cathodically-Protected At least two excavations and visual inspections of cathodically-protected steel piping will be conducted in each unit.</p> <p>c. Steel Piping with Potentially Degraded Cathodic Protection At least three excavations and visual inspections of fire protection steel piping with potentially degraded bonding straps will be conducted at the Palo Verde site.</p> <p>Prior to the period of extended operation, the Buried Piping and Tanks Inspection program will include provisions to (1) ensure electrical power is maintained to the cathodic protection system for in-scope buried piping at least 90% of the time (e.g., monthly verification that the power supply circuit breakers are closed or other verification that power is being provided to the system), and (2) ensure that the National Association of Corrosion Engineers (NACE) cathodic protection system surveys are performed at least annually. (RCTSAs 3246909 [U1]; 3247263 [U2]; 3247264 [U3])</p>		enhancements to the buried piping and tanks inspection program prior to the period of operation ¹ .
21	<p>The One-Time Inspection of ASME Code Class 1 Small-Bore Piping program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAs 3246910 [U1]; 3247265 [U2]; 3247266 [U3])</p>	A1.19 B2.1.19 One-Time Inspection of ASME Code Class 1 Small-Bore Piping	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
22	<p>The External Surfaces Monitoring Program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAs 3246911 [U1]; 3247272 [U2]; 3247273 [U3])</p>	A1.20 B2.1.20 External Surfaces Monitoring Program	Prior to the period of extended operation ¹ .
23	<p>APS will:</p> <p>A. Reactor Coolant System Nickel Alloy Pressure Boundary Components Implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines, (3) participate in the industry initiatives, such as owners group programs and the EPRI Materials Reliability Program, for managing aging effects associated with nickel alloys, (4) upon completion of these programs, but not less than 24 months before entering the period of extended operation, APS will submit an inspection plan for reactor coolant system nickel alloy pressure boundary components to the NRC for review and approval, and</p> <p>B. Reactor Vessel Internals (1) Participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, APS will submit an inspection plan for reactor internals to the NRC for review and approval.</p> <p>C. Pressurizer Spray Heads Comply with applicable NRC Orders and implement applicable (1) Bulletins and Generic Letters, and (2) staff-accepted industry guidelines. (RCTSAs 3246912 [U1]; 3247274 [U2]; 3247276 [U3])</p>	A1.21 B2.1.21 Reactor Coolant System Supplement 3.1.2.2.16.2 Pressurizer spray head cracking	Not less than 24 months prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
24	The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAs 3246914 [U1]; 3247277 [U2]; 3247278 [U3])	A1.22 B2.1.22 Inspection Of Internal Surfaces In Miscellaneous Piping And Ducting Components	Prior to the period of extended operation ¹ .
25	Existing Lubricating Oil Analysis program is credited for license renewal. (RCTSAI 3246915)	A1.23 B2.1.23 Lubricating Oil Analysis	Ongoing
26	The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAI 3246917)	A1.24 B2.1.24 Electrical Cables And Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to the period of extended operation ¹ .
27	Existing Electrical Cables And Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements Used In Instrumentation Circuits program is credited for license renewal , AND Prior to the period of extended operation: <ul style="list-style-type: none"> • Procedures will be enhanced to identify license renewal scope, require cable testing of ex-core neutron monitoring cables, require an evaluation of the calibration results for non-EQ area radiation monitors, and require acceptance criteria for cable testing be established based on the type of cable and type of test performed. (RCTSAI 3246919) 	A1.25 B2.1.25 Electrical Cables And Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements Used In Instrumentation Circuits	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
28	The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAI 3246920)	A1.26 B2.1.26 Inaccessible Medium Voltage Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements	Prior to the period of extended operation ¹ .
29	Existing ASME Section XI, Subsection IWE program is credited for license renewal. (RCTSAI 3246921)	A1.27 B2.1.27 ASME Section XI, Subsection IWE	Ongoing
30	Existing ASME Section XI, Subsection IWL program is credited for license renewal. (RCTSAI 3246922)	A1.28 B2.1.28 ASME Section XI, Subsection IWL	Ongoing
31	Existing ASME Section XI, Subsection IWF program is credited for license renewal. (RCTSAI 3246923)	A1.29 B2.1.29 ASME Section XI, Subsection IWF	Ongoing
32	Existing 10 CFR 50, Appendix J program is credited for license renewal. (RCTSAI 3246924)	A1.30 B2.1.30 10 CFR 50, Appendix J	Ongoing
33	Existing Masonry Wall Program is credited for license renewal, AND Prior to the period of extended operation, procedures will be enhanced to specify ACI 349.3R-96 as the reference for qualification of personnel to inspect structures under the Masonry Wall Program, which is part of the Structures Monitoring Program. (RCTSAI 3246926)	A1.31 B2.1.31 Masonry Wall Program	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
34	<p>Existing Structures Monitoring Program is credited for license renewal, AND</p> <p>Prior to the period of extended operation:</p> <ul style="list-style-type: none"> • The Structures Monitoring Program will be enhanced to specify ACI 349.3R-96 as the reference for qualification of personnel to inspect structures under the Structures Monitoring Program. • For structures within the scope of license renewal, the Structures Monitoring Program will be enhanced to establish the frequency of inspection for each unit at a 5 year interval, with the exception of exterior surfaces of the following nonsafety-related structures, below-grade structures, and structures within a controlled interior environment, which will be inspected at an interval of 10 years: <ul style="list-style-type: none"> • Fire Pump House (Yard Structures) • Radwaste Building • Station Blackout Generator Structures • Turbine Building • Non-Safety Related Tank Foundations and Shells • Non-Safety Related Transformer Foundations and Electrical Structures • The Structures Monitoring Program will be enhanced to quantify the acceptance criteria and critical parameters for monitoring degradation, and to provide guidance for identifying unacceptable conditions requiring further technical evaluation or corrective action. Procedures will also be enhanced to incorporate applicable industry codes, standards and guidelines for acceptance criteria. <p>(RCTSAI 3246927)</p>	A1.32 B2.1.32 Structures Monitoring Program	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
35	Existing RG 1.127, Inspection Of Water-Control Structures Associated With Nuclear Power Plants program is credited for license renewal, AND Prior to the period of extended operation, procedures will be enhanced to specify that the essential spray ponds inspections include concrete below the water level. (RCTSAI 3246928)	A1.33 B2.1.33 RG 1.127, Inspection Of Water-Control Structures Associated With Nuclear Power Plants	Prior to the period of extended operation ¹ .
36	Existing Nickel Alloy Aging Management Program is credited for license renewal. (RCTSAI 3260208)	A1.34 B2.1.34 Nickel Alloy Aging Management Program	Ongoing
37	The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAs 3246930 [U1]; 3247228 [U2]; 3247231 [U3])	A1.35 B2.1.35 Electrical Cable Connections Not Subject To 10 CFR 50.49 environmental qualification requirements	Prior to the period of extended operation ¹ .
38	The Metal Enclosed Bus program is a new program and will be completed before the period of extended operation and once every 10 years thereafter. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAs 3246932 [U1]; 3247220 [U2]; 3247221 [U3])	A1.36 B2.1.36 Metal Enclosed Bus	Prior to the period of extended operation and once every ten years thereafter.
39	No later than two years prior to the period of extended operation, the following enhancements will be implemented <ul style="list-style-type: none"> • Cumulative usage factor tracking will be implemented for NUREG/CR-6260 locations not monitored by cycle counting (the reactor vessel shell and lower head (juncture) location will be monitored by cycle counting). For PVNGS locations identified in NUREG/CR-6260 and monitored by CUF, fatigue usage factor action limits will be required for including effects of the reactor 	4.3.1 Fatigue Aging Management Program A2.1 B3.1 Metal Fatigue of Reactor Coolant Pressure Boundary	No later than two years prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
	<p>coolant environment.</p> <ul style="list-style-type: none"> • The Metal Fatigue of Reactor Coolant Pressure Boundary program will be enhanced to include a computerized program to track and manage both cycle counting and fatigue usage factor. FatiguePro® will be used for cycle counting and cycle-based fatigue (CBF) monitoring methods. FatiguePro® is an EPRI licensed product. • The enhanced Metal Fatigue of Reactor Coolant Pressure Boundary program will monitor plant transients as required by PVNGS Technical Specification 5.5.5. Cumulative usage factors (CUFs) will be calculated for a subset of ASME III Class 1 reactor coolant pressure boundary vessel and piping locations, and component locations with Class 1 analyses. The following methods will be used: <ol style="list-style-type: none"> 1) The Metal Fatigue of Reactor Coolant Pressure Boundary program will be enhanced to use cycle based fatigue (CBF) and stress based fatigue (SBF) CUF calculations to monitor fatigue. FatiguePro® will be used for cycle counting and cycle-based fatigue (CBF) monitoring methods. FatiguePro® is an EPRI licensed product. 2) The SBF method will use a fatigue monitoring software program that incorporates a three-dimensional, six-component stress tensor method meeting ASME III NB-3200 requirements. • The enhanced Metal Fatigue of Reactor Coolant Pressure Boundary program will provide action limits on cycles and on CUF that will initiate corrective actions before the licensing basis limits on fatigue effects at any location are exceeded. <ul style="list-style-type: none"> ◦ In order to ensure sufficient cycle count margin to accommodate occurrence of a low-probability transient, corrective actions must be taken before the remaining number of allowable occurrences for any specified 		

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
	<ul style="list-style-type: none"> transient becomes less than 1. ○ CUF action limits will be established to require corrective action when the calculated CUF (from cycle-based or stress-based monitoring) for any monitored location is projected to reach 1.0 within the next 2 or 3 operating cycles. In order to ensure sufficient margin to accommodate occurrence of a low-probability transient, corrective actions will be taken while there is still sufficient margin to accommodate at least one occurrence of the worst-case design transient event (i.e., with the highest fatigue usage per event cycle). <p>(RCTSAI 3246934)</p>		
40	<p>Existing Environmental Qualification program is credited for license renewal, AND</p> <p>maintaining qualification through the extended license renewal period requires that existing EQ evaluations (EEQDFs) be re-evaluated.</p> <p>(RCTSAI 3246935)</p>	A2.2 B3.2 Environmental Qualification (EQ) Of Electrical Components	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
41	<p>Existing Concrete Containment Tendon Prestress program is credited for license renewal, AND</p> <ul style="list-style-type: none"> • The program will be enhanced to continue to compare regression analysis trend lines of the individual lift-off values of tendons surveyed to date, in each of the vertical and hoop tendon groups, with the MRV and PLL for each tendon group, to the end of the licensed operating period, and to take appropriate corrective actions if future values indicated by the regression analysis trend line drop below the PLL or MRV. The regression analyses will be updated for tendons of the affected unit and for a combined data set of all three units following each inspection of an individual unit. • Prior to the period of extended operation, procedures will be enhanced to require an update of the regression analysis for each tendon group of each unit, and of the joint regression of data from all three units, after every tendon surveillance. The documents will invoke and describe regression analysis methods used to construct the lift-off trend lines, including the use of individual tendon data in accordance with Information Notice (IN) 99-10, "Degradation of Prestressing Tendon Systems in Prestressed Concrete Containments." • The Tendon Integrity test procedure will be revised to extend the list of surveillance tendons to include random samples for the year 45 and 55 surveillances. (RCTSAI 3246937) 	A2.3 B3.3 Concrete Containment Tendon Prestress 4.5 Concrete Containment Tendon Prestress	Prior to the period of extended operation ¹ .
42	APS will confirm the RCS Pressure-Temperature limits basis for 54 EFPY prior to operation beyond 32 EFPY and will update documents in accordance with the provisions of 10 CFR 50.59. (RCTSAI 3246939)	A3.1.3 Pressure-Temperature Limits	Prior to operation beyond 32 EFPY ¹ .
43	Completed (RCTSAI 3246941)		
44	Completed (RCTSAI 3253459)		
45	See Item No. 46 (RCTSAI 3246943)		

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
46	An extension of ISI Relief Request 31, Revision 1 authorization will be requested for the period of extended operation, supported by a continuation of the cold shutdown time monitoring program. (RCTSAI 3246945)	4.7.4 Fatigue Crack Growth and Fracture Mechanics Stability Analyses of Half-Nozzle Repairs to Alloy 600 Material in Reactor Coolant Hot Legs; Absence of a TLAA for Supporting Corrosion Analyses	Prior to the period of extended operation ¹ .
47	Once the ground surface is made less permeable and ambient monitoring is sufficient to characterize subsurface water quality, a [tritiated water] remediation plan will be implemented. (RCTSAI 3246946)	Environmental Report 2.3	12/31/10
48	New Evaporation Pond No. 3 is currently under construction and is being built using a Best Available Demonstrated Control Technology (BADCT), a geosynthetic clay liner, with two overlaying HDPE liners, including a leachate collection and recovery system, plus soil cement side armoring, including a leak detection system. Following that, the existing liner in Evaporation Pond No. 2 will be replaced with the same BADCT liner system. This liner is approaching the end of its useful life. Following that, the existing liner in Evaporation Pond Number 1 will be replaced with the same BADCT liner system. (RCTSAI: 3246947)	Environmental Report 3.1.2	12/31/15
49	APS commits to implement SAMAs 6, 17 and 23 prior to the period of extended operation. (RCTSAI 3246952)	Environmental Report D.8	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
50	The Fuse Holder program is a new program that will be implemented prior to the period of extended operation and once every 10 years thereafter. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program (RCTSAI 3409443)	A1.37 B2.1.37 Fuse Holder	Prior to the period of extended operation and once every 10 years thereafter.
51	The original Unit 3 reactor pressure vessel (RPV) head is planned to be replaced during the fall refueling outage in 2010. All components penetrating the new heads and welds including the head vent will be replaced with Alloy 690. The Unit 2 RPV head was replaced during 2R15 outage in fall 2009, and the Unit 1 RPV head was replaced during 1R15 in spring 2010. (RCTSAI 3410460)	B2.1.34 Nickel Alloy Aging Management Program	12/31/10
52	APS will consider SAMA 8 for potential implementation. (RCTSAI 3420542)	Follow-up Response to SAMA RAI (letter no. 102-06121, dated January 13, 2010)	Prior to the period of extended operation ¹ .
53	Completed (RCTSAI 3429933)		
54	By August 30, 2010, APS will ensure that the abandoned containment spray chemical addition tanks and associated piping components in PVNGS Units 1, 2, and 3 are drained to preclude any spatial interactions with safety related components. (RCTSAI 3443855)	Response to RAI 2.1-03, Issue (2), in APS letter no. 102-06162, dated 4/2/10	8/30/10
55	The transient in UFSAR Table 3.9-1 Sheet No. 9 Item No. I.E.1.b, and Sheet No. 18, Item No. III.A.1.f, "Standby to SI hot leg injection check valve stroke test to standby (using the HPSI pump)," will be added to the cycle counting surveillance procedure 73ST-9RC02 by August 25, 2010. (RCTSAI 3469024)	4.3.1 Fatigue Aging Management Program (Table 4.3-2, Row No. 25)	8/25/10

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
56	The spray pond wall rework/repair methods are currently being determined, and the rework/repair is planned to begin in 2011. As Unit 1 spray ponds have the most degradation, work is planned to start there followed by Units 2 and 3. It is expected that the work will be completed in all three units in 2015. (RCTSAI 3484623)	Follow-up Response to RAI B2.1.33-2 (letter no. 102-06205, dated June 21, 2010)	12/31/2015
57	No later than two years prior to the period of extended operation, APS will confirm the conservatism of the F_{en} value of 1.49 using the methods specified in NUREG/CR-6909, and will use the F_{en} calculated using the NUREG/CR-6909 methods if it is more conservative than the 1.49 value. (RCTSAI 3488220)	Response to RAI RAI 4.3-6 (letter no. 102-06210, dated June 29, 2010)	No later than two years prior to the period of extended operation ¹ .
58	No later than two years prior to the period of extended operation, APS will perform a reanalysis of the pressurizer heater penetrations to consider EAF effects using the formulas and methodology given in NUREG/CR-6909. (RCTSAI 3488223)	Response to RAI RAI 4.3-6 (letter no. 102-06210, dated June 29, 2010)	No later than two years prior to the period of extended operation ¹ .

- (1) "Prior to period of extended operation," "prior to operation beyond 32 EFPY," and "prior to the end of the current licensed operating period," is prior to the following PVNGS Operating License expiration dates: Unit 1: June 1, 2025; Unit 2: April 24, 2026; Unit 3: November 25, 2027.

B1.3 QUALITY ASSURANCE PROGRAM AND ADMINISTRATIVE CONTROLS

The PVNGS Quality Assurance Program implements the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants," and is consistent with the summary provided in Appendix A.2 of NUREG-1800 and the Appendix, "Quality Assurance for Aging Management Programs" of NUREG-1801. The PVNGS Quality Assurance Program includes the elements of corrective action, confirmation process, and administrative controls. The PVNGS Quality Assurance Program is applicable to all safety-related and nonsafety-related systems, structures, and components (SSCs) that are subject to aging management activities. Each of these three elements is applicable as follows:

Corrective Action

PVNGS applies its corrective action process to safety-related and, after enhancement, nonsafety-related systems, structures, and components that are subject to aging management. Corrective action process procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants*. Conditions adverse to quality (such as failures, malfunctions, deviations, defective material and equipment, and nonconformances) are promptly identified and corrected. Significant conditions adverse to quality (such as failures, malfunctions, deviations, defective material and equipment, and nonconformances) are promptly identified and corrected. In the case of significant conditions adverse to quality, measures are implemented to ensure that the cause is determined and that corrective action is taken to preclude repetition. In addition, the root cause of the significant condition adverse to quality and the corrective actions implemented are documented and reported to appropriate levels of management.

Confirmation Process

The PVNGS Quality Assurance Program requires that measures be taken to preclude repetition of significant conditions adverse to quality. These measures include actions to verify effective implementation of corrective actions.

Plant procedures include provisions for timely evaluation of adverse conditions and implementation of any corrective actions required, including root cause determinations and prevention of recurrence where appropriate (e.g., significant conditions adverse to quality). These procedures provide for tracking, coordinating, monitoring, reviewing, verifying, validating, and approving corrective actions, and to ensure corrective actions have been effectively implemented.

The corrective action process is also monitored for potentially adverse trends. Identification of a potentially adverse trend due to recurring or repetitive unacceptable conditions will result in the initiation of a corrective action document.

Follow-up inspections required by the confirmation process are documented in accordance with the corrective action process. The corrective action process constitutes the confirmation process for aging management programs and activities. The same 10 CFR 50

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Appendix B corrective actions and confirmation process applies to nonconforming systems, structures, and components subject to aging management review.

Administrative Controls

PVNGS administrative controls require formal procedures and other forms of written instruction for the activities performed under the programs credited for managing aging. These PVNGS procedures contain objectives, program scope, responsibilities, methods for implementation, and acceptance criteria.

Enhancements

None

Appendix B
AGING MANAGEMENT PROGRAMS

B2.1.12 Fire Protection

Program Description

The Fire Protection program manages loss of material for fire rated doors, fire dampers, diesel-driven fire pumps, and the CO₂ and halon fire suppression systems, cracking, spalling, and loss of material for fire barrier walls, ceilings, and floors, and hardness and shrinkage due to weathering of fire barrier penetration seals. Periodic visual inspections of fire barrier penetration seals, fire dampers, fire barrier walls, ceilings and floors, and periodic visual inspections and functional tests of fire-rated floors are performed to ensure that they can perform their intended function.

The Fire Protection program manages aging by a visual inspection on ten percent of each type of penetration seal at least once every 18 months. This sample set method ensures that each penetration seal is inspected at least once every 15 years.

The Fire Protection program manages aging by a visual inspection every 18 months of the fire barrier walls, ceilings, and floors, including coating and wraps of Thermo-lag enclosures, examining for any signs of aging such as cracking, spalling, and loss of material.

The Fire Protection program manages aging by drop testing on ten percent of all accessible fire dampers on an 18 month basis.

The Fire Protection program manages aging by performing visual inspections every 18 months on fire-rated doors to verify the integrity of door surfaces and for clearances to detect aging of the fire doors prior to the loss of intended function.

The diesel-driven fire pumps are under observation during performance tests such as flow tests, start/run tests for detecting any aging of the fuel supply line. The fuel oil supply line is also managed by the Fuel Oil Chemistry program (B2.1.14) and External Surface Monitoring Program (B2.1.20).

A visual inspection and function test of the halon and CO₂ fire suppression systems is performed every 18 months (with the exception of destructive testing of the Electro-Thermal Links (ETLs) and functional testing of the dampers which are performed every 54 months).

NUREG-1801 Consistency

The Fire Protection program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M26, "Fire Protection," with an exception.

Exceptions to NUREG-1801

Program Elements Affected

Parameters Monitored or Inspected - Element 3 and Detection of Aging Effects – Element 4

NUREG-1801 recommends a visual inspection and function test of the halon and CO₂ systems every six months. The PVNGS procedures for visual inspections and function testing of the halon and CO₂ fire suppression systems are performed every 18 months

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(excluding destructive testing of the Electro-Thermal Links (ETLs) and functional testing of the dampers, which are both performed every 54 months per TSR 3.11.103.5, 3.11.103.6, 3.11.106.5 and 3.11.106.6) per Technical Requirements Manual Surveillance Requirement (TSR) 3.11.106.4 and 3.11.103.4, respectively. These functional tests will also identify any mechanical damage of the halon and CO₂ fire suppression system that prevents the system from performing its intended function. With respect to the 54 month destructive testing of the Electro-Thermal Links (ETLs), PVNGS has performed an engineering analysis, consistent with the methodology described within EPRI Technical Report 1006756 "Fire Protection Equipment Surveillance Optimization and Maintenance Guide 2003" to extend the frequency of the test so that the confidence of functionality obtained by successful completion of the test is aligned with reliability and logistical concerns of the test. The calculation indicates that a full functional test every six years of the dampers actuated by ETLs will maintain a 95% success rate assuming the same amount of failures as have occurred in the last 10 years and adjusting for uncertainty at the 99% level. The selection of a testing interval of 54 months, compared to the calculated value of 72 months for 95% success rate, provides an additional margin of protection. The test frequency is considered sufficient to ensure system availability and operability based on station operating history that indicates no loss of intended function due to aging. A review of the past ten years of operating experience and corrective action documentation has shown no degradation or loss of intended function between test intervals.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

Parameters Monitored or Inspected – Element 3, and Detection of Aging Effects – Element 4

Procedures will be enhanced to perform the testing of the Electro-Thermal Links (ETLs) and functional testing of the halon and CO₂ dampers every 18 months or at the frequency specified in the current licensing basis in effect upon entry into the period of extended operation.

Operating Experience

Plant operating experience indicates that there have been instances of Thermo-Lag degradation and cracking. These portions of affected Thermo-Lag envelopes have been reworked according to PVNGS specification. PVNGS has also experienced door skin cracks. These have been weld repaired according to specification.

During May of 2005, a fire protection audit was performed by members of APS and other industry representatives. The audit team observed current conditions and installations of the CO₂ and halon suppression systems during walk-downs of selected fire zones. All systems were found in good condition. Multiple walkdowns per unit were conducted to examine the current condition of existing fire barriers in the Unit 1 control building, the Unit 2 turbine building, and the Unit 3 auxiliary building. There was one adverse condition identified in the Unit 3 auxiliary building where copper piping was penetrating the floor barriers. The audit team found no degraded conditions (e.g., cracks, gouges, holes in material, joint/seal gaps) of installed electrical raceway fire barriers.

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In September of 2006, it was discovered that a carbon steel pipe nipple was in need of replacement due to galvanic corrosion and was subsequently replaced. The nipple was located between a galvanized tee and a brass valve. This event is representative of the PVNGS experience of detecting degradations and leakage in time to take corrective action prior to the loss of intended function.

During the 2007 fire protection audit, a concern was raised for the need of a plan to identify fire protection equipment obsolescence issues. Design modifications have been identified to address these issues.

Conclusion

The continued implementation of the Fire Protection program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.18 Buried Piping and Tanks Inspection

Program Description

The Buried Piping and Tanks Inspection program manages loss of material on external surfaces of buried components in the following systems: chemical and volume control, condensate storage and transfer, diesel fuel storage and transfer, domestic water, fire protection, SBOG fuel system, service gas and essential spray ponds. Opportunistic visual inspections will monitor the condition of protective coatings and wrappings found on carbon steel, gray cast iron or ductile iron components and assess the condition of stainless steel components with no protective coatings or wraps. Any evidence of damaged wrapping or coating defects is an indicator of possible corrosion damage to the external surface of the components.

The Buried Piping and Tanks Inspection program is a new program that will be implemented prior to the period of extended operation.

Within the ten year period prior to entering the period of extended operation an opportunistic or planned inspection of buried tanks at the Palo Verde site will be performed.

The visual inspections noted below of piping in a soil environment within the scope of license renewal will be conducted within the ten-year period prior to entering the period of extended operation, and during each ten year period after entering the period of extended operation. Each inspection will:

- select accessible locations where degradation is expected to be high;
- excavate and visually inspect the circumference of the pipe; and
- examine at least ten feet of pipe.

a. Metallic Piping not Cathodically-Protected

At least two excavations and visual inspections of stainless steel piping will be conducted in each unit. Stainless steel piping within the scope of license renewal exists in the following systems:

- Chemical and Volume Control (CH),
- Condensate Transfer and Storage (CT), and
- Fire Protection (FP).

b. Steel Piping Cathodically-Protected

At least two excavations and visual inspections of cathodically-protected steel piping will be conducted in each unit.

c. Steel Piping with Potentially Degraded Cathodic Protection

At least three excavations and visual inspections of fire protection steel piping with potentially degraded bonding straps will be conducted at the Palo Verde site.

Prior to the period of extended operation, the Buried Piping and Tanks Inspection program will include provisions to (1) ensure electrical power is maintained to the cathodic protection system for in-scope buried piping at least 90% of the time (e.g., monthly verification that the power supply circuit breakers are closed or other verification that power is being provided to the system), and (2) ensure that the National Association of Corrosion Engineers (NACE) cathodic protection system surveys are performed at least annually.

NUREG-1801 Consistency

The Buried Piping and Tanks Inspection program is a new program that, when implemented, will be consistent with exception to NUREG-1801, Section XI.M34, "Buried Piping and Tanks Inspection".

Exceptions to NUREG-1801

Program Elements Affected

Scope of Program – Element 1 and Acceptance Criteria- Element 6

NUREG-1801, Section XI.M34 scope only includes buried steel piping and components. However, PVNGS also includes stainless steel in their buried piping program that will be managed as part of this aging management program.

Scope of Program – Element 1, Preventive Actions – Element 2, and Acceptance Criteria- Element 6

NUREG-1801, Section XI.M34 relies on preventive measures such as coatings and wrappings. However, portions of buried stainless steel piping may not be coated or wrapped. Inspections of buried piping that is not wrapped will inspect for loss of material due to general, pitting, crevice, and microbiologically influenced corrosion.

Enhancements

None

Operating Experience

The Buried Piping and Tanks Inspection program is a new program. Degradation of buried components was addressed at PVNGS during an inspection program in September 2002. Observations of this inspection program include:

During the past several years, leaks developed in various buried piping segments, which potentially threaten the continuous operation of PVNGS. These leaks collectively indicated a negative trend in the overall integrity of the buried pipe.

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Inspection and maintenance activities were implemented in order to address overall integrity of the buried pipe. Determination of system priorities and development of a draft inspection plan for each of the evaluated systems was developed.

The applicable systems with piping installed below grade were evaluated and assigned ranking based on priority. The majority of these evaluated buried piping systems have very little or no identified potential for degradation.

The majority of the systems evaluated in the inspection program are not within the scope of license renewal. The PVNGS corrective action documentation to date has shown that, for the systems within the scope of license renewal, degradation has been found primarily in the fire protection system. Fire protection system has had localized degradation in excess of the minimum wall requirement of 40% nominal wall thickness. The designated segments of the degraded ductile iron piping have been replaced by fiberglass reinforced plastic piping. The fire protection system has not experienced a failure that affected the ability of the plant to achieve and maintain safe shutdown in the event of a fire. To date, the actual pipe failures of the underground fire protection system have been isolated and repaired without adversely affecting any fire protection water suppression system.

Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

Conclusion

The implementation of the Buried Piping and Tanks Inspection program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

ENCLOSURE 2

**Palo Verde Nuclear Generating Station License Renewal
Application Amendment No. 20 – Markup Pages**

Palo Verde Nuclear Generating Station
License Renewal Application
Amendment No. 20

Source: RAI Non-regenerative Heat Exchanger (LRA 3.3.2.2.4.1) Response

LRA 3.3.2.2, Further Evaluation of Aging Management as Recommended by NUREG-1801, Section 3.3.2.2.4.1, Stainless Steel PWR non-regenerative heat exchanger components exposed to borated water, page 3.3-36, is revised as shown below. Deleted text is shown in strike through and new text is shown underlined.

3.3.2.2.4 Cracking due to Stress Corrosion Cracking and Cyclic Loading

3.3.2.2.4.1 Stainless steel PWR non-regenerative heat exchanger components exposed to borated water

The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) will manage cracking due to stress corrosion cracking and cyclic loading for the stainless steel CVCS letdown (non-regenerative) heat exchanger components exposed to treated borated water. Temperature and radioactivity of the shell-side water are monitored by installed instrumentation. The One-Time Inspection program (B2.1.16) is selected in lieu of eddy-current testing of tubes will select heat exchanger tubes with similar materials and environment, including fluid temperatures, to those of the CVCS letdown (non-regenerative) heat exchanger with consideration for temperatures above the threshold of cracking for stainless steel. The One-Time Inspection program (B2.1.16) will perform eddy-current testing of stainless steel heat exchanger tubes in a borated water environment that is above the threshold temperature for cracking of stainless steel.

~~This position was found acceptable to the NRC staff in NUREG-1785, "Safety Evaluation Report Related to the License Renewal of H. B. Robinson Steam Electric Plant, Unit 2".~~

A1 SUMMARY DESCRIPTIONS OF AGING MANAGEMENT PROGRAMS

The integrated plant assessment and evaluation of time-limited aging analyses (TLAA) identified existing and new aging management programs necessary to provide reasonable assurance that components within the scope of License Renewal will continue to perform their intended functions consistent with the current licensing basis (CLB) for the period of extended operation. Sections A1 and A2 describe the programs and their implementation activities.

Three elements common to all aging management programs discussed in Sections A1 and A2 are corrective actions, confirmation process, and administrative controls. These elements are included in the PVNGS Quality Assurance (QA) Program, which implements the requirements of 10 CFR 50, Appendix B. The PVNGS Quality Assurance Program is applicable to all safety-related and, after enhancement, will also be applicable to the nonsafety-related systems, structures and components that are subject to aging management review activities.

~~Procedures will be enhanced to include those nonsafety related SSCs requiring aging management within the scope of the PVNGS Quality Assurance Program to address the elements of corrective actions, confirmation process, and administrative controls.~~

A1.12 FIRE PROTECTION

The Fire Protection program manages loss of material for fire rated doors, fire dampers, diesel-driven fire pumps, and the halon/CO₂ fire suppression systems, cracking, spalling, and loss of material for fire barrier walls, ceilings, and floors, and hardness and shrinkage due to weathering of fire barrier penetration seals. Periodic visual inspections of fire barrier penetration seals, fire dampers, fire barrier walls, ceilings and floors, and periodic visual inspections and functional tests of fire-rated doors manage aging. Periodic testing of the diesel-driven fire pumps ensures that there is no loss of function due to aging of diesel fuel supply lines. Drop tests are performed on 10 percent of fire dampers on an 18 month basis to manage aging. Visual inspections manage aging of fire-rated doors every 18 months to verify the integrity of door surfaces and for clearances to detect aging of the fire doors. A visual inspection and function test of the halon and CO₂ fire suppression systems every 18 months (along with the destructive testing of the Electro-Thermal Links (ETLs) and functional testing of the dampers which are both performed every 54 months) manages aging. Ten percent of each type of penetration seal is visually inspected at least once every 18 months. Fire barrier walls, ceilings, and floors including coatings and wraps are visually inspected at least once every 18 months.

Prior to the period of extended operation procedures will be enhanced to perform the testing of the Electro-Thermal Links (ETLs) and functional testing of the halon and CO₂ dampers every 18 months or at the frequency specified in the current licensing basis in effect upon entry into the period of extended operation, the following enhancements will be implemented:

- ~~Procedures will be enhanced to inspect for mechanical damage, corrosion and loss of material of the CO₂ system discharge nozzles.~~
- ~~Procedures will be enhanced to state the qualification requirements for inspecting penetration seals, fire rated doors, fire barrier walls, ceilings and floors.~~

A1.18 BURIED PIPING AND TANKS INSPECTION

The Buried Piping and Tanks Inspection program manages loss of material of buried components in the chemical and volume control, condensate storage and transfer, diesel fuel storage and transfer, domestic water, fire protection, SBOG fuel system, service gas and essential spray ponds systems. Visual inspections monitor the condition of protective coatings and wrappings found on carbon steel, gray cast iron or ductile iron components and assess the condition of stainless steel components with no protective coatings or wraps. The program includes opportunistic inspection of buried piping and tanks as they are excavated or on a planned basis if opportunistic inspections have not occurred.

The Buried Piping and Tanks Inspection program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

Within the ten year period prior to entering the period of extended operation an opportunistic or planned inspection of buried tanks at the Palo Verde site will be performed. ~~Within the ten year period prior to entering the period of extended operation the buried piping inspections noted below will be performed. Upon entering the period of extended operation the buried piping inspections noted below will be performed within ten years. Industry and plant specific operating experience will be evaluated in the development and implementation of this program.~~

The visual inspections noted below of piping in a soil environment within the scope of license renewal will be conducted within the ten-year period prior to entering the period of extended operation, and again within the first ten years ~~during each ten year period~~ after entering the period of extended operation. Each inspection will:

- select accessible locations where degradation is expected to be high;
 - excavate and visually inspect the circumference of the pipe; and
 - examine at least ten feet of pipe.
- a. Metallic Piping not Cathodically-Protected
- At least two excavations and visual inspections of stainless steel piping will be conducted in each unit. Stainless steel piping within the scope of license renewal exists in the following systems:
- o Chemical and Volume Control (CH),
 - o Condensate Transfer and Storage (CT), and
 - o Fire Protection (FP).
- b. Steel Piping Cathodically-Protected
- At least two excavations and visual inspections of cathodically-protected steel piping will be conducted in each unit.

Appendix A
Updated Final Safety Analysis Report Supplement

c. Steel Piping with Potentially Degraded Cathodic Protection

At least three excavations and visual inspections of fire protection steel piping with potentially degraded bonding straps will be conducted at the Palo Verde site.

Prior to the period of extended operation, the Buried Piping and Tanks Inspection program will include provisions to (1) ensure electrical power is maintained to the cathodic protection system for in-scope buried piping at least 90% of the time (e.g., monthly verification that the power supply circuit breakers are closed or other verification that power is being provided to the system), and (2) ensure that the National Association of Corrosion Engineers (NACE) cathodic protection system surveys are performed at least annually.

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
1	<p>Section A3 [of the LRA] contains evaluation summaries of TLAs for the period of extended operation. These summary descriptions of aging management programs, and time-limited aging analyses, and license renewal commitments contained in LRA Appendix A, "Updated Final Safety Analysis Supplement," as required by 10 CFR 54.21(d), will be incorporated in the Updated Final Safety Analysis Report for PVNGS Units 1, 2, and 3 in the next update required by 10 CFR 50.71(e) following the issuance of the renewed operating licenses in accordance with 10 CFR 50.71(e). (RCTSAI 3247244)</p>	A0	The next 10 CFR 50.71(e) UFSAR update following issuance of the renewed operating licenses. (Estimated June 30, 2011)
2	<p>Procedures will be enhanced to include those nonsafety-related SSCs requiring aging management within the scope of the PVNGS Quality Assurance Program to address the elements of corrective actions, confirmation process, and administrative controls. Existing Quality Assurance Program is credited for license renewal. (RCTSAI 3246887)</p>	A1 B1.3 Summary Descriptions Of Aging Management	Prior to the period of extended operation ¹ . Ongoing
3	<p>Existing ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program is credited for license renewal. (RCTSAI 3246890)</p>	A1.1 B2.1.1 ASME Section XI Inservice Inspection, Subsections IWB, IWC, AND IWD	Ongoing
4	<p>(LRA Amendment 9) Existing Water Chemistry program is credited for license renewal. (RCTSAI 3246891).</p>	A1.2 B2.1.2 Water Chemistry	Ongoing
5	<p>Existing Reactor Head Closure Studs program is credited for license renewal. (RCTSAI 3246892)</p>	A1.3 B2.1.3 Reactor Head Closure Studs	Ongoing
6	<p>Existing Boric Acid Corrosion program is credited for license renewal. (RCTSAI 3246893)</p>	A1.4 B2.1.4 Boric Acid Corrosion	Ongoing

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
7	<p>(LRA Supplement 1) Existing Nickel-Alloy Penetration Nozzles Welded to The Upper Reactor Vessel Closure Heads of Pressurized Water Reactors program is credited for license renewal, AND</p> <p>Prior to December 31, 2008, the PVNGS Alloy 600 Management Program Plan will be revised to incorporate the applicable examination requirements of ASME Code Case N-729-1 (Reactor Vessel Head Inspections), subject to the conditions specified in 10 CFR 50.55a(g)(6)(ii)(D)(2) through(6). (RCTSAI 3246894) (Completed)</p>	A1.5 B2.1.5 Nickel-Alloy Penetration Nozzles Welded to The Upper Reactor Vessel Closure Heads of Pressurized Water Reactors	Ongoing
8	<p>(LRA Amendment 3) Existing Flow-Accelerated Corrosion program is credited for license renewal, AND</p> <p>Prior to the period of extended operation, the program will be enhanced to clarify the guidance for susceptible small-bore piping components (Completed) (RCTSAI 3246895)</p>	A1.6 B2.1.6 Flow-Accelerated Corrosion	Ongoing
9	Existing Bolting Integrity program is credited for license renewal. (RCTSAI 3246896)	A1.7 B2.1.7 Bolting Integrity	Ongoing
10	Existing Steam Generator Tube Integrity program is credited for license renewal. (RCTSAI 3246897)	A1.8 B2.1.8 Steam Generator Tube Integrity	Ongoing

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
11	<p>(LRA Amendment 3) Existing Open-Cycle Cooling Water System program is credited for license renewal, AND Prior to the period of extended operation, the program will be enhanced to: <input type="checkbox"/> clarify guidance in the conduct of heat exchanger inspections using NDE techniques and related acceptance criteria (Completed), and <input type="checkbox"/> clarify guidance in the conduct of piping inspections using NDE techniques and related acceptance criteria. (RCTSAI 3246898)</p>	A1.9 B2.1.9 Open-Cycle Cooling Water System	Prior to the period of extended operation ¹
12	Existing Closed-Cycle Cooling Water System program is credited for license renewal, AND Prior to the period of extended operation, procedures will be enhanced to incorporate the guidance of EPRI TR-107396 with respect to water chemistry control for frequency of sampling and analysis, normal operating limits, action level concentrations, and times for implementing corrective actions upon attainment of action levels. (RCTSAI 3246899)	A1.10 B2.1.10 Closed-Cycle Cooling Water System	Prior to the period of extended operation ¹ .
13	Existing Inspection Of Overhead Heavy Load And Light Load (Related To Refueling) Handling Systems program is credited for license renewal, AND Prior to the period of extended operation, procedures will be enhanced to inspect for loss of material due to corrosion or rail wear. (RCTSAI 3246900)	A1.11 B2.1.11 Inspection Of Overhead Heavy Load And Light Load (Related To Refueling) Handling Systems	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
14	<p>(LRA Amendment 12) Existing Fire Protection program is credited for license renewal, AND Prior to the period of extended operation procedures will be enhanced to perform the testing of the Electro-Thermal Links (ETLs) and functional testing of the halon and CO₂ dampers every 18 months or at the frequency specified in the current licensing basis in effect upon entry into the period of extended operation., the following enhancements will be implemented:</p> <ul style="list-style-type: none"> • Procedures will be enhanced to state trending requirements for the diesel-driven fire pump. (Completed) • Procedures will be enhanced to include visual inspection of the fuel supply line to detect degradation. (Completed) • Procedures will be enhanced to inspect for mechanical damage, corrosion and loss of material of the halon discharge pipe header (Completed) and the CO₂ system discharge nozzles. • Procedures will be enhanced to state the qualification requirements for inspecting penetration seals, fire rated doors, fire barrier walls, ceilings and floors. (RCTSAI 3246901)	A1.12 B2.1.12 Fire Protection	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
15	<p>(LRA Amendment 9) Existing Fire Water System program is credited for license renewal, AND Prior to the period of extended operation, the following enhancements will be implemented:</p> <ul style="list-style-type: none"> • Specific procedures will be enhanced to include review and approval requirements under the Nuclear Administrative Technical Manual (NATM). • Procedures will be enhanced to be consistent with the current code of record or NFPA 25 2002 Edition. • Procedures will be enhanced to field service test 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. • Procedures will be enhanced to be consistent with NFPA 25 Section 7.3.2.1, 7.3.2.2, 7.3.2.3, and 7.3.2.4. • Procedures will be enhanced to state trending requirements. (Completed) • Procedures will be enhanced 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 WRF (Water Reclamation Facility). (Completed) <p>(RCTSAI 3246902)</p>	A1.13 B2.1.13 Fire Water System	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
16	<p>(LRA Amendment 3) Existing Fuel Oil Chemistry program is credited for license renewal, AND Prior to the period of extended operation: <ul style="list-style-type: none"> • Procedures will be enhanced to extend the scope of the program to include the SBOG fuel oil storage tank and SBOG skid fuel tanks. • Procedures will be enhanced to include ten-year periodic draining, cleaning, and inspections on the diesel-driven fire pump day tanks, the SBOG fuel oil storage tank, and SBOG skid fuel tanks. • Ultrasonic testing (UT) or pulsed eddy current (PEC) thickness examination will be conducted to detect corrosion-related wall thinning if degradation is found during the visual inspections and once on the tank bottoms for the EDG fuel oil storage tanks, EDG fuel oil day tanks, diesel-driven fire pump day tanks, SBOG fuel oil storage tank, and SBOG skid fuel tanks. The onetime UT or PEC examination on the tank bottoms will be performed before the period of extended operation. (RCTSAI 3246903) </p>	A1.14 B2.1.14 Fuel Oil Chemistry	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
17	<p>Existing Reactor Vessel Surveillance program is credited for license renewal, AND</p> <p>Prior to the period of extended operation:</p> <ul style="list-style-type: none"> • The schedule will be revised to withdraw the next capsule at the equivalent clad-base metal exposure of approximately 54 EFPY expected for the 60-year period of operation, and to withdraw remaining standby capsules at equivalent clad-base metal exposures not exceeding the 72 EFPY expected for a possible 80-year second period of extended operation. This withdrawal schedule is in accordance with NUREG-1801, Section XI.M31, item 6, and with the ASTM E 185-82 criterion which states that capsules may be removed when the capsule neutron fluence is between one and two times the limiting fluence calculated for the vessel at the end of expected life. This schedule change must be approved by the NRC, as required by 10 CFR 50 Appendix H. • If left in the reactor beyond the presently-scheduled withdrawal, the next scheduled surveillance capsule in each unit will reach a clad-base metal 54 EFPY equivalent at about 40 actual operating EFPY (40, 39, and 42 actual EFPY in Units 1, 2, and 3, respectively). • Procedures will be enhanced to identify the withdrawal of the remaining standby capsules at 72 EFPY, at about 50 to 54 actual operating EFPY, near the end of the extended licensed operating period. The need to monitor vessel fluence following removal of the remaining standby capsules, and ex-vessel or in-vessel methods, will be addressed prior to removing the remaining capsules. <p>(RCTSAI 3246904)</p>	A1.15 B2.1.15 Reactor Vessel Surveillance	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
18	<p>The One-Time Inspection program conducts one-time inspections of plant system piping and components to verify the effectiveness of the Water Chemistry program (A1.2), Fuel Oil Chemistry program (A1.14), and Lubricating Oil Analysis program (A1.23). The aging effects to be evaluated by the One-Time Inspection program are loss of material, cracking, and reduction of heat transfer.</p> <p>(RCTSAs 3246906 [U1]; 3247258 [U2]; 3247259 [U3])</p>	A1.16 B2.1.16 One-Time Inspection	<u>Within the ten year period prior to the period of extended operation¹.</u> <u>Prior to the period of extended operation¹.</u>
19	<p>(LRA Amendment 12)</p> <p>The Selective Leaching of Materials program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.</p> <p>(RCTSAs 3246908 [U1]; 3247260 [U2]; 3247261 [U3])</p>	A1.17 B2.1.17 Selective Leaching Of Materials	Within the 10-ten year period prior to the period of extended operation ¹ .
20	<p>(LRA Amendment 17)</p> <p>The Buried Piping and Tanks Inspection program is a new program that will be implemented prior to the period of extended operation.</p> <p>Within the ten year period prior to entering the period of extended operation an opportunistic or planned inspection of buried tanks at the Palo Verde site will be performed. Within the ten year period prior to entering the period of extended operation the buried piping inspections noted below will be performed. The buried piping inspections noted below will be performed within the first ten years of the period of extended.</p> <p>The visual inspections noted below of piping in a soil environment within the scope of license renewal will be conducted within the ten-year period prior to entering the period of extended operation, and again within the first ten years during each ten year period after entering the period of extended operation. Each inspection will:</p> <ul style="list-style-type: none"> • select accessible locations where degradation is expected to 	A1.18 B2.1.18 Buried Piping And Tanks Inspection	<u>Perform the buried piping and tanks inspections Wwithin the ten year period prior to the period of extended operation¹.</u> <u>AND</u> <u>Within the first ten years</u> <u>Perform the buried piping inspections during each ten year period</u> <u>after entering the period of extended operation.</u> <u>AND</u>

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
	<p>be high;</p> <ul style="list-style-type: none"> • excavate and visually inspect the circumference of the pipe; and • examine at least ten feet of pipe. <p>a. Metallic Piping not Cathodically-Protected At least two excavations and visual inspections of stainless steel piping will be conducted in each unit. Stainless steel piping within the scope of license renewal exists in the following systems:</p> <ul style="list-style-type: none"> ◦ Chemical and Volume Control (CH), ◦ Condensate Transfer and Storage (CT), and ◦ Fire Protection (FP). <p>b. Steel Piping Cathodically-Protected At least two excavations and visual inspections of cathodically-protected steel piping will be conducted in each unit.</p> <p>c. Steel Piping with Potentially Degraded Cathodic Protection At least three excavations and visual inspections of fire protection steel piping with potentially degraded bonding straps will be conducted at the Palo Verde site.</p> <p><u>Prior to the period of extended operation, the Buried Piping and Tanks Inspection program will include provisions to (1) ensure electrical power is maintained to the cathodic protection system for in-scope buried piping at least 90% of the time (e.g., monthly verification that the power supply circuit breakers are closed or other verification that power is being provided to the system), and (2) ensure that the National Association of Corrosion Engineers (NACE) cathodic protection system surveys are performed at least annually.</u></p> <p>(RCTSAs 3246909 [U1]; 3247263 [U2]; 3247264 [U3])</p>		<u>Implement the additional enhancements to the buried piping and tanks inspection program prior to the period of operation¹.</u>

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
21	(LRA Amendment 3) The One-Time Inspection of ASME Code Class 1 Small-Bore Piping program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAIs 3246910 [U1]; 3247265 [U2]; 3247266 [U3])	A1.19 B2.1.19 One-Time Inspection of ASME Code Class 1 Small-Bore Piping	Prior to the period of extended operation ¹ .
22	The External Surfaces Monitoring Program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAIs 3246911 [U1]; 3247272 [U2]; 3247273 [U3])	A1.20 B2.1.20 External Surfaces Monitoring Program	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
23	<p>(LRA Amendment 15) APS will:</p> <p>A. Reactor Coolant System Nickel Alloy Pressure Boundary Components Implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines, (3) participate in the industry initiatives, such as owners group programs and the EPRI Materials Reliability Program, for managing aging effects associated with nickel alloys, (4) upon completion of these programs, but not less than 24 months before entering the period of extended operation, APS will submit an inspection plan for reactor coolant system nickel alloy pressure boundary components to the NRC for review and approval, and</p> <p>B. Reactor Vessel Internals (1) Participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, APS will submit an inspection plan for reactor internals to the NRC for review and approval.</p> <p>C. Pressurizer Spray Heads Comply with applicable NRC Orders and implement applicable (1) Bulletins and Generic Letters, and (2) staff-accepted industry guidelines. (RCTSAIs 3246912 [U1]; 3247274 [U2]; 3247276 [U3])</p>	A1.21 B2.1.21 Reactor Coolant System Supplement 3.1.2.2.16.2 Pressurizer spray head cracking	Not less than 24 months prior to the period of extended operation ¹ .
24	<p>The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.</p> <p>(RCTSAIs 3246914 [U1]; 3247277 [U2]; 3247278 [U3])</p>	A1.22 B2.1.22 Inspection Of Internal Surfaces In Miscellaneous Piping And Ducting Components	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
25	Existing Lubricating Oil Analysis program is credited for license renewal. (RCTSAI 3246915)	A1.23 B2.1.23 Lubricating Oil Analysis	Ongoing
26	The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAI 3246917)	A1.24 B2.1.24 Electrical Cables And Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to the period of extended operation ¹ .
27	(LRA Amendment 9) Existing Electrical Cables And Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements Used In Instrumentation Circuits program is credited for license renewal , AND Prior to the period of extended operation: <ul style="list-style-type: none"> • Procedures will be enhanced to identify license renewal scope, require cable testing of ex-core neutron monitoring cables, require an evaluation of the calibration results for non-EQ area radiation monitors, and require acceptance criteria for cable testing be established based on the type of cable and type of test performed. • Procedures will be enhanced to require that an action request be written when the loop cannot be calibrated to meet acceptance criteria. (Completed) (RCTSAI 3246919)	A1.25 B2.1.25 Electrical Cables And Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements Used In Instrumentation Circuits	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
28	The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAI 3246920)	A1.26 B2.1.26 Inaccessible Medium Voltage Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements	Prior to the period of extended operation ¹ .
29	Existing ASME Section XI, Subsection IWE program is credited for license renewal. (RCTSAI 3246921)	A1.27 B2.1.27 ASME Section XI, Subsection IWE	Ongoing
30	Existing ASME Section XI, Subsection IWL program is credited for license renewal. (RCTSAI 3246922)	A1.28 B2.1.28 ASME Section XI, Subsection IWL	Ongoing
31	Existing ASME Section XI, Subsection IWF program is credited for license renewal. (RCTSAI 3246923)	A1.29 B2.1.29 ASME Section XI, Subsection IWF	Ongoing
32	Existing 10 CFR 50, Appendix J program is credited for license renewal. (RCTSAI 3246924)	A1.30 B2.1.30 10 CFR 50, Appendix J	Ongoing
33	Existing Masonry Wall Program is credited for license renewal, AND Prior to the period of extended operation, procedures will be enhanced to specify ACI 349.3R-96 as the reference for qualification of personnel to inspect structures under the Masonry Wall Program, which is part of the Structures Monitoring Program. (RCTSAI 3246926)	A1.31 B2.1.31 Masonry Wall Program	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
34	<p>(LRA Amendment 15) Existing Structures Monitoring Program is credited for license renewal, AND Prior to the period of extended operation: <ul style="list-style-type: none"> • The Structures Monitoring Program will be enhanced to specify ACI 349.3R-96 as the reference for qualification of personnel to inspect structures under the Structures Monitoring Program. • For structures within the scope of license renewal, the Structures Monitoring Program will be enhanced to establish the frequency of inspection for each unit at a 5 year interval, with the exception of exterior surfaces of the following nonsafety-related structures, below-grade structures, and structures within a controlled interior environment, which will be inspected at an interval of 10 years: <ul style="list-style-type: none"> • Fire Pump House (Yard Structures) • Radwaste Building • Station Blackout Generator Structures • Turbine Building • Non-Safety Related Tank Foundations and Shells • Non-Safety Related Transformer Foundations and Electrical Structures • The Structures Monitoring Program will be enhanced to quantify the acceptance criteria and critical parameters for monitoring degradation, and to provide guidance for identifying unacceptable conditions requiring further technical evaluation or corrective action. Procedures will also be enhanced to incorporate applicable industry codes, standards and guidelines for acceptance criteria. (RCTSAI 3246927) </p>	A1.32 B2.1.32 Structures Monitoring Program	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
35	<p>Existing RG 1.127, Inspection Of Water-Control Structures Associated With Nuclear Power Plants program is credited for license renewal, AND Prior to the period of extended operation, procedures will be enhanced to specify that the essential spray ponds inspections include concrete below the water level. (RCTSAI 3246928)</p>	A1.33 B2.1.33 RG 1.127, Inspection Of Water-Control Structures Associated With Nuclear Power Plants	Prior to the period of extended operation ¹ .
36	<p>LRA Supplement 1 Existing Nickel Alloy Aging Management Program is credited for license renewal, AND Prior to the period of extended operation, the PVNGS Alloy 600 Management Program Plan will be enhanced to add Alloy 600 steam generator components, including tube sheet cladding and portions of the primary nozzle cladding (RCTSAI 3246929) (Completed), AND In addition, prior to December 31, 2008, the PVNGS Alloy 600 Management Program Plan will be revised to incorporate the applicable examination requirements of ASME Code Case N-729-1 (Reactor Vessel Head Inspections), subject to the conditions specified in 10 CFR 50.55a(g)(6)(ii)(D)(2) through(6) and ASME Code Case N-722 (RCPB Visual Inspections) subject to the conditions listed in 10 CFR 50.55a(g)(6)(ii)(E)(2) through(4). (RCTSAI 3260208) (Completed)</p>	A1.34 B2.1.34 Nickel Alloy Aging Management Program	Ongoing
37	The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAIs 3246930 [U1]; 3247228 [U2]; 3247231 [U3])	A1.35 B2.1.35 Electrical Cable Connections Not Subject To 10 CFR 50.49 environmental qualification requirements	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
38	<p>The Metal Enclosed Bus program is a new program and will be completed before the period of extended operation and once every 10 years thereafter. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. (RCTSAs 3246932 [U1]; 3247220 [U2]; 3247221 [U3])</p>	A1.36 B2.1.36 Metal Enclosed Bus	Prior to the period of extended operation and once every <u>ten</u> 10 years thereafter.
39	<p>(LRA Amendment 16) No later than two years prior to the period of extended operation, the following enhancements will be implemented</p> <ul style="list-style-type: none"> • Cumulative usage factor tracking will be implemented for NUREG/CR-6260 locations not monitored by cycle counting (the reactor vessel shell and lower head (juncture) location will be monitored by cycle counting). For PVNGS locations identified in NUREG/CR-6260 and monitored by CUF, fatigue usage factor action limits will be required for including effects of the reactor coolant environment. • The Metal Fatigue of Reactor Coolant Pressure Boundary program will be enhanced to include a computerized program to track and manage both cycle counting and fatigue usage factor. FatiguePro® will be used for cycle counting and cycle-based fatigue (CBF) monitoring methods. FatiguePro® is an EPRI licensed product. • The enhanced Metal Fatigue of Reactor Coolant Pressure Boundary program will monitor plant transients as required by PVNGS Technical Specification 5.5.5. Cumulative usage factors (CUFs) will be calculated for a subset of ASME III Class 1 reactor coolant pressure boundary vessel and piping locations, and component locations with Class 1 analyses. The following methods will be used: <ol style="list-style-type: none"> 1) The Metal Fatigue of Reactor Coolant Pressure Boundary program will be enhanced to use cycle based fatigue (CBF) and stress based fatigue (SBF) CUF calculations to monitor fatigue. FatiguePro® will be used for cycle counting and cycle- 	4.3.1 Fatigue Aging Management Program A2.1 B3.1 Metal Fatigue of Reactor Coolant Pressure Boundary	No later than two years prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
	<p>based fatigue (CBF) monitoring methods. FatiguePro® is an EPRI licensed product.</p> <ul style="list-style-type: none"> 2) The SBF method will use a fatigue monitoring software program that incorporates a three-dimensional, six-component stress tensor method meeting ASME III NB-3200 requirements. • The enhanced Metal Fatigue of Reactor Coolant Pressure Boundary program will provide action limits on cycles and on CUF that will initiate corrective actions before the licensing basis limits on fatigue effects at any location are exceeded. <ul style="list-style-type: none"> ◦ In order to ensure sufficient cycle count margin to accommodate occurrence of a low-probability transient, corrective actions must be taken before the remaining number of allowable occurrences for any specified transient becomes less than 1. ◦ CUF action limits will be established to require corrective action when the calculated CUF (from cycle-based or stress-based monitoring) for any monitored location is projected to reach 1.0 within the next 2 or 3 operating cycles. In order to ensure sufficient margin to accommodate occurrence of a low-probability transient, corrective actions will be taken while there is still sufficient margin to accommodate at least one occurrence of the worst-case design transient event (i.e., with the highest fatigue usage per event cycle). <p>(RCTSAI 3246934)</p>		
40	<p>(LRA Amendment 9)</p> <p>Existing Environmental Qualification program is credited for license renewal, AND maintaining qualification through the extended license renewal period requires that existing EQ evaluations (EEQDFs) be re-evaluated.</p> <p>(RCTSAI 3246935)</p>	A2.2 B3.2 Environmental Qualification (EQ) Of Electrical Components	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
41	<p>Existing Concrete Containment Tendon Prestress program is credited for license renewal, AND</p> <ul style="list-style-type: none"> • The program will be enhanced to continue to compare regression analysis trend lines of the individual lift-off values of tendons surveyed to date, in each of the vertical and hoop tendon groups, with the MRV and PLL for each tendon group, to the end of the licensed operating period, and to take appropriate corrective actions if future values indicated by the regression analysis trend line drop below the PLL or MRV. The regression analyses will be updated for tendons of the affected unit and for a combined data set of all three units following each inspection of an individual unit. • Prior to the period of extended operation, procedures will be enhanced to require an update of the regression analysis for each tendon group of each unit, and of the joint regression of data from all three units, after every tendon surveillance. The documents will invoke and describe regression analysis methods used to construct the lift-off trend lines, including the use of individual tendon data in accordance with Information Notice (IN) 99-10, "Degradation of Prestressing Tendon Systems in Prestressed Concrete Containments." • The Tendon Integrity test procedure will be revised to extend the list of surveillance tendons to include random samples for the year 45 and 55 surveillances. <p>(RCTSAI 3246937)</p>	A2.3 B3.3 Concrete Containment Tendon Prestress 4.5 Concrete Containment Tendon Prestress	Prior to the period of extended operation ¹ .
42	APS will confirm the RCS Pressure-Temperature limits basis for 54 EFPY prior to operation beyond 32 EFPY and will update documents in accordance with the provisions of 10 CFR 50.59. (RCTSAI 3246939)	A3.1.3 Pressure-Temperature Limits	Prior to operation beyond 32 EFPY ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
43	<p>The segment of the Unit 2 head vent line with wall thickness reduced by the removal of indications will be replaced when the vessel head is replaced, and its fatigue analysis will be revised. The repair and the revised fatigue analysis will demonstrate an adequate fatigue life, projected to the end of the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(ii). This is a commitment for license renewal. <u>Completed (RCTSAI 3246941)</u></p>	4.3.2.1 A3.2.1.1 Reactor Pressure Vessel, Nozzles, Head, and Studs	Prior to the period of extended operation ¹ .
44	<p>(LRA Supplement 1) During the review process APS identified a number of ASME III Class 1 valves greater than four inches nominal inlet that might require a fatigue analysis, but for which the analysis was not immediately retrievable. Efforts are ongoing to confirm the need for and if necessary to obtain these analyses. APS will recover and evaluate the fatigue analysis for each of the remaining ASME III Class 1 valves greater than four inches nominal inlet, for which a fatigue analysis is also otherwise required, before the end of the current licensed operating period. Each of these analyses will be validated or revised for the period of extended operation, or fatigue in the valve will be managed by the Metal Fatigue of Reactor Coolant Pressure Boundary Program. <u>Completed (RCTSAI 3253459)</u></p>	4.3.2.6 A3.2.1.6 ASME Section III Class 1 Valves	Completed.

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April 10, 2009

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
45	<p>On March 25, 2005, PVNGS submitted APS letter 102-05237 to the NRC. This request uses CN-CI-02-71 and WCAP-15973-P in support of a request for exemption from the flaw removal and successive inspection requirements of ASME XI (1992) sections IWA-3300 and IWB-2420, for the alternative half-nozzle method used for the 10 PVNGS Unit 2 small bore, hot leg nozzles to be repaired during the Spring 2005 refueling outage. WCAP-15973-P calculated corrosion rates of 1.53 mils per year (mpy) for Alloy 600 nozzles. In response to the conditions of the final safety evaluation for the Westinghouse topical report, APS calculated that a limiting corrosion rate of 1.377 mpy for Unit 3 would not exceed the allowable diameter until 2058, 60 years after the repair and 10 years after the end of the period of extended operation. This calculation is therefore not a TLAA, and is valid for the period of extended operation. However, in the relief request submittal, APS made an ongoing commitment to track the time at cold shutdown conditions:</p> <p>APS commits to continue to track the time at cold shutdown conditions against the assumptions made in the corrosion analysis to assure that the allowable bore diameter is not exceeded over the life of the plant. If the analysis assumptions are exceeded, APS shall provide a revised analysis to the NRC and provide a discussion on whether volumetric inspection of the area is required.</p> <p>This commitment was made because the corrosion rate at cold shutdown conditions is significantly higher than at operating conditions. This request was authorized by the NRC, consistent with the APS commitment and is valid for the second, third, and fourth 10-year inspection intervals. Therefore, an extension of this authorization will be required for continued relief from the ASME code sections.</p> <p>See Item No. 46 (RCTSAI 3246943)</p>	4.7.4 Fatigue Crack Growth and Fracture Mechanics Stability Analyses of Half-Nozzle Repairs to Alloy 600 Material in Reactor Coolant Hot Legs; Absence of a TLAA for Supporting Corrosion Analyses	Prior to the period of extended operation ¹ .

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
46	<p>The WCAP 15973-P analysis of corrosion in the hot leg pipe wall due to exposure to reactor coolant by small bore half nozzle repairs was extended by APS for a period in excess of the period of extended operation, and is therefore not a TLAA. However the relief from the ASME Section XI requirements is supported by an APS commitment to continue to track the time at cold shutdown conditions against the assumptions made in the corrosion analysis, to assure that the allowable bore diameter is not exceeded over the life of the plant. This program is a condition of Revision 1 to Relief Request 31 of APS Letter 102-05324, granted by the NRC, and is applicable to all three units for the second, third, and fourth 10-year inspection intervals. An extension of this ISI Relief Request 31, Revision 1 authorization will be requested for the period of extended operation, supported by a continuation of the cold shutdown time monitoring program.</p> <p>(RCTSAI 3246945)</p>	4.7.4 Fatigue Crack Growth and Fracture Mechanics Stability Analyses of Half-Nozzle Repairs to Alloy 600 Material in Reactor Coolant Hot Legs; Absence of a TLAA for Supporting Corrosion Analyses	Prior to the period of extended operation ¹ .
47	<p>Once the ground surface is made less permeable and ambient monitoring is sufficient to characterize subsurface water quality, a [tritiated water] remediation plan will be implemented.</p> <p>(RCTSAI 3246946)</p>	Environmental Report 2.3	12/31/10
48	<p>New Evaporation Pond No. 3 is currently under construction and is being built using a Best Available Demonstrated Control Technology (BADCT), a geosynthetic clay liner, with two overlaying HDPE liners, including a leachate collection and recovery system, plus soil cement side armoring, including a leak detection system. Following that, the existing liner in Evaporation Pond No. 2 will be replaced with the same BADCT liner system. This liner is approaching the end of its useful life. Following that, the existing liner in Evaporation Pond Number 1 will be replaced with the same BADCT liner system.</p> <p>(RCTSAI: 3246947)</p>	Environmental Report 3.1.2	12/31/15

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
49	(LRA Amendment 2) APS commits to implement SAMAs 6, 17 and 23 prior to the period of extended operation. (RCTSAI 3246952)	Environmental Report D.8	Prior to the period of extended operation ¹ .
50	(LRA Amendment 3) The Fuse Holder program is a new program that will be implemented prior to the period of extended operation and once every 10 years thereafter. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program (RCTSAI 3409443)	A1.37 B2.1.37 Fuse Holder	Prior to the period of extended operation and once every 10 years thereafter.
51	(LRA Amendment 3) The original Unit 1 and Unit 3 reactor pressure vessel (RPV) heads are planned to be replaced during the fall refueling outages in 2010. All components penetrating the new heads and welds including the head vent will be replaced with Alloy 690. <u>The Unit 2 RPV head was replaced during 2R15 outage in fall 2009, and the Unit 1 RPV head was replaced during 1R15 in spring 2010.</u> (RCTSAI 3410460)	B2.1.34 Nickel Alloy Aging Management Program	12/31/10
52	(LRA Amendment 7) APS will consider SAMA 8 for potential implementation. (RCTSAI 3420542)	Follow-up Response to SAMA RAI (letter no. 102-06121, dated January 13, 2010)	Prior to the period of extended operation ¹ .
53	(LRA Amendment 15) The changes to LRA Table 4.5-1 shown in the response to RAI 4.5-1, and changes to LRA Figures 4.5-1, 2, 5, and 6 to reflect the results of the Unit 1 25-year tendon surveillance data regression analysis, will be submitted to the NRC in an LRA amendment by May 28, 2010. Completed Completed (RCTSAI 3429933)	Response to RAI 4.5-1 in APS letter no. 102-06160, dated 4/1/10.	Completed

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
54	(LRA Amendment 11) By August 30, 2010, APS will ensure that that the abandoned containment spray chemical addition tanks and associated piping components in PVNGS Units 1, 2, and 3 are drained to preclude any spatial interactions with safety related components. (RCTSAI 3443855)	Response to RAI 2.1-03, Issue (2), in APS letter no. 102-06162, dated 4/2/10	8/30/10
55	(LRA Amendment 14) The transient in UFSAR Table 3.9-1 Sheet No. 9 Item No. I.E.1.b, and Sheet No. 18, Item No. III.A.1.f, "Standby to Si hot leg injection check valve stroke test to standby (using the HPSI pump)," will be added to the cycle counting surveillance procedure 73ST-9RC02 by August 25, 2010. (RCTSAI 3469024)	4.3.1 Fatigue Aging Management Program (Table 4.3-2, Row No. 25)	8/25/10
56	(LRA Amendment 17) The spray pond wall rework/repair methods are currently being determined, and the rework/repair is planned to begin in 2011. As Unit 1 spray ponds have the most degradation, work is planned to start there followed by Units 2 and 3. It is expected that the work will be completed in all three units in 2015. (RCTSAI 3484623)	Follow-up Response to RAI B2.1.33-2 (letter no. 102-06205, dated June 21, 2010)	12/31/2015
57	(LRA Amendment 18) No later than two years prior to the period of extended operation, APS will confirm the conservatism of the F_{en} value of 1.49 using the methods specified in NUREG/CR-6909, and will use the F_{en} calculated using the NUREG/CR-6909 methods if it is more conservative than the 1.49 value. (RCTSAI 3488220)	Response to RAI RAI 4.3-6 (letter no. 102-06210, dated June 29, 2010)	No later than two years prior to the period of extended operation ¹ .
58	(LRA Amendment 18) No later than two years prior to the period of extended operation, APS will perform a reanalysis of the pressurizer heater penetrations to consider EAF effects using the formulas and methodology given in NUREG/CR-6909. (RCTSAI 3488223)	Response to RAI RAI 4.3-6 (letter no. 102-06210, dated June 29, 2010)	No later than two years prior to the period of extended operation ¹ .

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Updated Final Safety Analysis Report Supplement

Table A4-1 License Renewal Commitments

- (1) "Prior to period of extended operation," "prior to operation beyond 32 EFPY," and "prior to the end of the current licensed operating period," is prior to the following PVNGS Operating License expiration dates: Unit 1: June 1, 2025; Unit 2: April 24, 2026; Unit 3: November 25, 2027.

B1.3 QUALITY ASSURANCE PROGRAM AND ADMINISTRATIVE CONTROLS

The PVNGS Quality Assurance Program implements the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants," and ~~will be~~ is consistent with the summary provided in Appendix A.2 of NUREG-1800 and the Appendix, "Quality Assurance for Aging Management Programs" of NUREG-1801. The PVNGS Quality Assurance Program includes the elements of corrective action, confirmation process, and administrative controls. The PVNGS Quality Assurance Program is applicable to all safety-related and, ~~after enhancement, will also be applicable to all~~ nonsafety-related systems, structures, and components (SSCs) that are subject to aging management activities. Each of these three elements is applicable as follows:

Corrective Action

PVNGS applies its corrective action process to safety-related and, after enhancement, nonsafety-related systems, structures, and components that are subject to aging management. Corrective action process procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants*. Conditions adverse to quality (such as failures, malfunctions, deviations, defective material and equipment, and nonconformances) are promptly identified and corrected. Significant conditions adverse to quality (such as failures, malfunctions, deviations, defective material and equipment, and nonconformances) are promptly identified and corrected. In the case of significant conditions adverse to quality, measures are implemented to ensure that the cause is determined and that corrective action is taken to preclude repetition. In addition, the root cause of the significant condition adverse to quality and the corrective actions implemented are documented and reported to appropriate levels of management.

Confirmation Process

The PVNGS Quality Assurance Program requires that measures be taken to preclude repetition of significant conditions adverse to quality. These measures include actions to verify effective implementation of corrective actions.

Plant procedures include provisions for timely evaluation of adverse conditions and implementation of any corrective actions required, including root cause determinations and prevention of recurrence where appropriate (e.g., significant conditions adverse to quality). These procedures provide for tracking, coordinating, monitoring, reviewing, verifying, validating, and approving corrective actions, and to ensure corrective actions have been effectively implemented.

The corrective action process is also monitored for potentially adverse trends. Identification of a potentially adverse trend due to recurring or repetitive unacceptable conditions will result in the initiation of a corrective action document.

Follow-up inspections required by the confirmation process are documented in accordance with the corrective action process. The corrective action process constitutes the confirmation process for aging management programs and activities. The same 10 CFR 50

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Appendix B corrective actions and confirmation process applies to nonconforming systems, structures, and components subject to aging management review.

Administrative Controls

PVNGS administrative controls require formal procedures and other forms of written instruction for the activities performed under the programs credited for managing aging. These PVNGS procedures contain objectives, program scope, responsibilities, methods for implementation, and acceptance criteria.

Enhancements

~~Procedures will be enhanced to include these nonsafety-related SSCs requiring aging management within the scope of the PVNGS Quality Assurance Program to address the elements of corrective actions, confirmation process, and administrative controls. None~~

B2.1.12 Fire Protection

Program Description

The Fire Protection program manages loss of material for fire rated doors, fire dampers, diesel-driven fire pumps, and the CO₂ and halon fire suppression systems, cracking, spalling, and loss of material for fire barrier walls, ceilings, and floors, and hardness and shrinkage due to weathering of fire barrier penetration seals. Periodic visual inspections of fire barrier penetration seals, fire dampers, fire barrier walls, ceilings and floors, and periodic visual inspections and functional tests of fire-rated floors are performed to ensure that they can perform their intended function.

The Fire Protection program manages aging by a visual inspection on ten percent of each type of penetration seal at least once every 18 months. This sample set method ensures that each penetration seal is inspected at least once every 15 years.

The Fire Protection program manages aging by a visual inspection every 18 months of the fire barrier walls, ceilings, and floors, including coating and wraps of Thermo-lag enclosures, examining for any signs of aging such as cracking, spalling, and loss of material.

The Fire Protection program manages aging by drop testing on ten percent of all accessible fire dampers on an 18 month basis.

The Fire Protection program manages aging by performing visual inspections every 18 months on fire-rated doors to verify the integrity of door surfaces and for clearances to detect aging of the fire doors prior to the loss of intended function.

The diesel-driven fire pumps are under observation during performance tests such as flow tests, start/run tests for detecting any aging of the fuel supply line. The fuel oil supply line is also managed by the Fuel Oil Chemistry program (B2.1.14) and External Surface Monitoring Program (B2.1.20).

A visual inspection and function test of the halon and CO₂ fire suppression systems is performed every 18 months (with the exception of destructive testing of the Electro-Thermal Links (ETLs) and functional testing of the dampers which are performed every 54 months).

NUREG-1801 Consistency

The Fire Protection program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M26, "Fire Protection," with an exception.

Exceptions to NUREG-1801

Program Elements Affected

Parameters Monitored or Inspected - Element 3 and Detection of Aging Effects – Element 4

NUREG-1801 recommends a visual inspection and function test of the halon and CO₂ systems every six months. The PVNGS procedures for visual inspections and function testing of the halon and CO₂ fire suppression systems are performed every 18 months

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(excluding destructive testing of the Electro-Thermal Links (ETLs) and functional testing of the dampers, which are both performed every 54 months per TSR 3.11.103.5, 3.11.103.6, 3.11.106.5 and 3.11.106.6) per Technical Requirements Manual Surveillance Requirement (TSR) 3.11.106.4 and 3.11.103.4, respectively. These functional tests will also identify any mechanical damage of the halon and CO₂ fire suppression system that prevents the system from performing its intended function. With respect to the 54 month destructive testing of the Electro-Thermal Links (ETLs), PVNGS has performed an engineering analysis, consistent with the methodology described within EPRI Technical Report 1006756 "Fire Protection Equipment Surveillance Optimization and Maintenance Guide 2003" to extend the frequency of the test so that the confidence of functionality obtained by successful completion of the test is aligned with reliability and logistical concerns of the test. The calculation indicates that a full functional test every six years of the dampers actuated by ETLs will maintain a 95% success rate assuming the same amount of failures as have occurred in the last 10 years and adjusting for uncertainty at the 99% level. The selection of a testing interval of 54 months, compared to the calculated value of 72 months for 95% success rate, provides an additional margin of protection. The test frequency is considered sufficient to ensure system availability and operability based on station operating history that indicates no loss of intended function due to aging. A review of the past ten years of operating experience and corrective action documentation has shown no degradation or loss of intended function between test intervals.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

Parameters Monitored or Inspected – Element 3, and Detection of Aging Effects – Element 4, and Acceptance Criteria – Element 6

~~Procedures will be enhanced to inspect for mechanical damage, corrosion and loss of material of the CO₂ system discharge nozzles.~~

~~Procedures will be enhanced to state the qualification requirements for inspecting penetration seals, fire rated doors, fire barrier walls, ceilings and floors.~~

Procedures will be enhanced to perform the testing of the Electro-Thermal Links (ETLs) and functional testing of the halon and CO₂ dampers every 18 months or at the frequency specified in the current licensing basis in effect upon entry into the period of extended operation.

Operating Experience

Plant operating experience indicates that there have been instances of Thermo-Lag degradation and cracking. These portions of affected Thermo-Lag envelopes have been reworked according to PVNGS specification. PVNGS has also experienced door skin cracks. These have been weld repaired according to specification.

During May of 2005, a fire protection audit was performed by members of APS and other industry representatives. The audit team observed current conditions and installations of the CO₂ and halon suppression systems during walk-downs of selected fire zones. All systems were found in good condition. Multiple walkdowns per unit were conducted to

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examine the current condition of existing fire barriers in the Unit 1 control building, the Unit 2 turbine building, and the Unit 3 auxiliary building. There was one adverse condition identified in the Unit 3 auxiliary building where copper piping was penetrating the floor barriers. The audit team found no degraded conditions (e.g., cracks, gouges, holes in material, joint/seal gaps) of installed electrical raceway fire barriers.

In September of 2006, it was discovered that a carbon steel pipe nipple was in need of replacement due to galvanic corrosion and was subsequently replaced. The nipple was located between a galvanized tee and a brass valve. This event is representative of the PVNGS experience of detecting degradations and leakage in time to take corrective action prior to the loss of intended function.

During the 2007 fire protection audit, a concern was raised for the need of a plan to identify fire protection equipment obsolescence issues. Design modifications have been identified to address these issues.

Conclusion

The continued implementation of the Fire Protection program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.18 Buried Piping and Tanks Inspection

Program Description

The Buried Piping and Tanks Inspection program manages loss of material on external surfaces of buried components in the following systems: chemical and volume control, condensate storage and transfer, diesel fuel storage and transfer, domestic water, fire protection, SBOG fuel system, service gas and essential spray ponds. Opportunistic visual inspections will monitor the condition of protective coatings and wrappings found on carbon steel, gray cast iron or ductile iron components and assess the condition of stainless steel components with no protective coatings or wraps. Any evidence of damaged wrapping or coating defects is an indicator of possible corrosion damage to the external surface of the components.

The Buried Piping and Tanks Inspection program is a new program that will be implemented prior to the period of extended operation.

Within the ten year period prior to entering the period of extended operation an opportunistic or planned inspection of buried tanks at the Palo Verde site will be performed. ~~Within the ten year period prior to entering the period of extended operation the buried piping inspections noted below will be performed. The buried piping inspections noted below will be performed within the first ten years of the period of extended operation.~~

The visual inspections noted below of piping in a soil environment within the scope of license renewal will be conducted within the ten-year period prior to entering the period of extended operation, and ~~again within the first ten years during each ten year period~~ after entering the period of extended operation. Each inspection will:

- select accessible locations where degradation is expected to be high;
- excavate and visually inspect the circumference of the pipe; and
- examine at least ten feet of pipe.

a. Metallic Piping not Cathodically-Protected

At least two excavations and visual inspections of stainless steel piping will be conducted in each unit. Stainless steel piping within the scope of license renewal exists in the following systems:

- Chemical and Volume Control (CH),
- Condensate Transfer and Storage (CT), and
- Fire Protection (FP).

b. Steel Piping Cathodically-Protected

At least two excavations and visual inspections of cathodically-protected steel piping will be conducted in each unit.

c. Steel Piping with Potentially Degraded Cathodic Protection

At least three excavations and visual inspections of fire protection steel piping with potentially degraded bonding straps will be conducted at the Palo Verde site.

Prior to the period of extended operation, the Buried Piping and Tanks Inspection program will include provisions to (1) ensure electrical power is maintained to the cathodic protection system for in-scope buried piping at least 90% of the time (e.g., monthly verification that the power supply circuit breakers are closed or other verification that power is being provided to the system), and (2) ensure that the National Association of Corrosion Engineers (NACE) cathodic protection system surveys are performed at least annually.

NUREG-1801 Consistency

The Buried Piping and Tanks Inspection program is a new program that, when implemented, will be consistent with exception to NUREG-1801, Section XI.M34, "Buried Piping and Tanks Inspection".

Exceptions to NUREG-1801

Program Elements Affected

Scope of Program – Element 1 and Acceptance Criteria- Element 6

NUREG-1801, Section XI.M34 scope only includes buried steel piping and components. However, PVNGS also includes stainless steel in their buried piping program that will be managed as part of this aging management program.

Scope of Program – Element 1, Preventive Actions – Element 2, and Acceptance Criteria- Element 6

NUREG-1801, Section XI.M34 relies on preventive measures such as coatings and wrappings. However, portions of buried stainless steel piping may not be coated or wrapped. Inspections of buried piping that is not wrapped will inspect for loss of material due to general, pitting, crevice, and microbiologically influenced corrosion.

Enhancements

None

Operating Experience

The Buried Piping and Tanks Inspection program is a new program. Degradation of buried components was addressed at PVNGS during an inspection program in September 2002. Observations of this inspection program include:

During the past several years, leaks developed in various buried piping segments, which potentially threaten the continuous operation of PVNGS. These leaks collectively indicated a negative trend in the overall integrity of the buried pipe.

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Inspection and maintenance activities were implemented in order to address overall integrity of the buried pipe. Determination of system priorities and development of a draft inspection plan for each of the evaluated systems was developed.

The applicable systems with piping installed below grade were evaluated and assigned ranking based on priority. The majority of these evaluated buried piping systems have very little or no identified potential for degradation.

The majority of the systems evaluated in the inspection program are not within the scope of license renewal. The PVNGS corrective action documentation to date has shown that, for the systems within the scope of license renewal, degradation has been found primarily in the fire protection system. Fire protection system has had localized degradation in excess of the minimum wall requirement of 40% nominal wall thickness. The designated segments of the degraded ductile iron piping have been replaced by fiberglass reinforced plastic piping. The fire protection system has not experienced a failure that affected the ability of the plant to achieve and maintain safe shutdown in the event of a fire. To date, the actual pipe failures of the underground fire protection system have been isolated and repaired without adversely affecting any fire protection water suppression system.

Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

Conclusion

The implementation of the Buried Piping and Tanks Inspection program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.