A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear Generating Station

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102-06160-DCM/GAM
April 01, 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
Response to March 2, 2010, Request for Additional Information Regarding Settlement, Tendons, Liner, Water Structures, for the Review of the PVNGS License Renewal Application, and License Renewal Application Amendment No. 13

By letter dated March 2, 2010, the Nuclear Regulatory Commission staff issued a request for additional information (RAI) related to the PVNGS license renewal application (LRA). Enclosure 1 contains Arizona Public Service Company's response to the March 2, 2010 RAI.

Enclosure 2 contains LRA Amendment No. 13 to reflect changes made as a result of the RAI responses. In addition, LRA Amendment No. 13 in Enclosure 2 contains the following changes:

- Sections 3.1.2.1.3 and 3.1.2.2.16.2, and Tables 2.3.1-3, 3.1.1, and 3.1.2-3, have been revised to add the pressurizer spray heads to the scope of license renewal.

- Table 3.2.1, item 3.2.1.03, and associated LRA Section 3.2.2.2.3.1 and Table 3.2.2-4, have been revised to include aging management evaluation of stainless steel containment isolation piping and components whose internal surfaces are exposed to treated water.

- LRA changes described in Enclosures 3 and 5.

Enclosure 3 contains a supplemental response to RAI B2.1.32-1 regarding the Structures Monitoring Program. This supplemental response replaces the response to RAI B2.1.32-1 in APS letter no. 102-06134, dated February 19, 2010, and addresses a

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question asked during the NRC license renewal inspection the week of February 22, 2010, and documented in Palo Verde Action Request (PVAR) 3439495.

Enclosure 4 contains a supplemental response to RAI 4.7.5-1 regarding pressurizer nozzles to provide additional information to the response provided in APS letter no. 102-06140, dated March 1, 2010.

Enclosure 5 contains a supplemental response to RAI 2.1-2 regarding the use of the moderate energy crack evaluation. This supplemental response replaces the response to RAI 2.1-2 in APS letter no. 102-06129, dated February 5, 2010, and addresses a question asked during the NRC license renewal inspection the week of February 22, 2010, and documented in Palo Verde Action Request (PVAR) 3440560.

Enclosure 6 contains a supplemental response to RAI 2.3-01 regarding spatial interaction terminations for domestic water and demineralized water. This supplemental response provides additional information to the RAI 2.3-01 response provided in APS letter no. 102-06122, dated January 18, 2010.

Commitments being revised by this letter are shown on the LRA Table A4-1 mark-ups in Enclosure 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 4/1/10
(date)

Sincerely,

D. C. McIntyre

DCM/RAS/GAM

Enclosures:

1. Response to March 2, 2010, Request for Additional Information Regarding Settlement, Tendons, Liner, Water Structures, for the Review of the PVNGS License Renewal Application

2. Palo Verde Nuclear Generating Station License Renewal Application Amendment No. 13

3. Supplemental Response to RAI B2.1.32-1, Structures Monitoring Program

4. Supplemental Response to RAI 4.7.5-1, Pressurizer Nozzles

5. Supplemental Response to RAI 2.1-2, Moderate Energy Crack Evaluation

6. Supplemental Response to RAI 2.3-01, Spatial Interaction terminations for Domestic Water and Demineralized Water

cc:

E. E. Collins Jr.	NRC Region IV Regional Administrator
J. R. Hall	NRC NRR 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

Response to March 2, 2010, Request for Additional Information Regarding Settlement, Tendons, Liner, Water Structures, for the Review of the PVNGS License Renewal Application

NRC RAI 4.5-1

Background:

Section 4.5 stated that the 25-year containment prestressed tendons surveillance of Unit 1 was not completed in time to be included in the LRA; therefore, a tendon regression analysis "was performed on Unit 1 and 3 horizontal and vertical tendon data including the 15-year surveillances for Units 1 and 3, and on the 20-year surveillance data for Unit 2."

Issue:

Section 4.5 of the LRA, pages 4.5-5 through 4.5-16, does not include the results of the 25-year containment prestressed tendons surveillance of Unit 1 that was completed in 2008. Section 4.5 should incorporate the data and results from the 25-year tendon surveillance of the Unit 1 containment, so that the staff can confirm that the loss of prestress is expected to remain within acceptable values for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(ii).

Request:

Provide the data and results from the 25-year tendon surveillance of the Unit 1 containment.

APS Response to RAI 4.5-1

The Unit 1 25-year tendon surveillance data are provided below as additions to LRA Table 4.5-1. Inserted values are underlined and marked with light gray shading; dots indicate lines omitted from this copy.

The horizontal tendon lift-offs are all below the previous Unit 1 horizontal tendon regression line shown on LRA Figure 4.5-1 (1431 kips at 27.32 years). However, all but one of the horizontal tendon lift-offs are above the previous combined-unit horizontal tendon regression line shown on LRA Figure 4.5-5 (1364 kips at 27.32 years). In both cases the margin between these lines and both the wall and dome tendon minimum required values (MRVs) indicates that the recalculated regression lines will remain well above these MRVs at 60 years.

The vertical tendon lift-offs are all below the previous Unit 1 and combined-unit vertical tendon regression lines shown on LRA Figures 4.5-2 and 4.5-6 (1436 and 1426 kips, respectively, at 26.37 years). Again, the margin between these lines and the vertical tendon MRV indicates that the recalculated regression lines will remain well above the MRV at 60 years.

In addition to providing the Unit 1 25-year tendon surveillance data, the Unit 1 5-year H13-19 field-end liftoff data line is provided in LRA Table 4.5-1 below to correct an omission of this line in the original submittal.

Table 4.5-1 Tendon Regression Analysis Input Data For PVNGS Units 1, 2, and 3

Unit	Year (1)	Tendon (2)	End	Force, Kips	Date	Tension Date	Time at Tension (Years)
Horizontal Cylinder Wall and Dome (Hoop) Tendons							
1	1	H13-07	Field	1393	01/27/84	02/16/82	1.94
...	...	...	...	...	...	...	...
1	3	H21-42	Shop	1468	01/03/86	05/19/81	4.63
1	5	H13-19	Field	1420	03/06/88	02/11/82	6.06
1	5	H13-19	Shop	1364	04/26/88	02/11/82	6.20
...	...	...	...	...	...	...	...
1	15	**H32-30**	Shop	1463	06/02/98	05/27/81	17.02
1	25	H13-14	Field	1426	09/13/08	06/25/81	27.22
1	25	H13-14	Shop	1399	09/16/08	06/25/81	27.23
1	25	H32-26	Field	1414	09/19/08	05/28/81	27.31
1	25	H32-26	Shop	1333	09/13/08	05/28/81	27.30
1	25	**H32-30**	Field	1413	09/19/08	05/27/81	27.32
1	25	**H32-30**	Shop	1424	09/13/08	05/27/81	27.30
2	20	H21-40	Field	1368	07/08/05	05/03/82	23.18
...	...	...	...	...	...	...	...
3	15	H21-43	Shop	1408	08/16/02	10/27/83	18.80
Inverted-U Vertical Tendons							
1	1	V32	Field	1462	01/09/84	12/1/1981	2.11
...	...	...	...	...	...	...	...
1	15	**V75**	Shop	1409	07/16/98	11/24/1981	16.64
1	25	V8	Field	1385	02/22/08	11/09/1981	26.29
1	25	V8	Shop	1405	02/22/08	11/09/1981	26.29
1	25	V15	Field	1332	02/25/08	10/14/1981	26.37
1	25	V15	Shop	1403	02/25/08	10/14/1981	26.37
1	25	**V75**	Field	1421	02/25/08	11/24/1981	26.25
1	25	**V75**	Shop	1422	02/22/08	11/24/1981	26.24
2	20	V26	Field	1380	09/08/05	8/13/1982	23.07
...	...	...	...	...	...	...	...
3	15	V57	Shop	1378	07/10/02	2/7/1984	18.42

1 Nominal, post- SIT (Structural Integrity Test).
2 Boldface numbers are "common" tendons, examined at each tendon prestress surveillance.

The regression analysis is being revised to incorporate the Unit 1 25-year tendon surveillance data. The changes to LRA Table 4.5-1 shown above, 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 (see commitment no. 53 in Table A4-1 in LRA Amendment 13 in Enclosure 2).

NRC RAI 4.5-2

Background:

Section 4.5 of the LRA stated that Nuclear Regulatory Commission (NRC) staff approved a revised schedule for the containment prestressed tendons surveillance in Relief Request RR-L4. The Relief Request RR-L4 permits a 10-year interval between tendon prestress surveillance for the three units.

Issue:

RR-L4 is valid for the 40 years of operation during the current licensing basis. The LRA did not address the period of extended operation.

Request:

Provide information on how the aging of the containment tendons will be managed during the period of extended operation.

APS Response to RAI 4.5-2

For the period of extended operation, aging of the containment tendons will be managed by performing inspections as described in the applicable edition and addenda of the ASME Section XI, Subsection IWL, in accordance with 10 CFR 50.55(a), including any NRC-approved relief requests. At this time, PVNGS is not aware of any specific relief requests that will be submitted for NRC approval.

NRC RAI 4.6-1

Background

Section 4.6.1 of the LRA states that the Updated Final Safety Analysis Report (UFSAR) contains no description of cyclic loads or design cycles for the entire containment building. Section 3.8.1.5.4.B of the UFSAR described design cycles that are to be included in the design of the liner plate and penetrations. The applicant further states in the LRA that review of the design specifications, design report, and design calculations found time dependent aspects of some penetration designs, but none for liner plate design. The applicant concludes in the LRA that the liner plate design is not supported by a time limited aging analysis (TLAA). As a result, the

applicant did not evaluate fatigue of the liner plate for cyclic loading during the period of extended operation.

Issue

The UFSAR, Section 3.8.1.5.4, "Liner Plate System," item B, "Loads," states that the following loads are considered in liner design:

1. Thermal cycling due to annual outdoor temperature variations where:

   a. Daily temperature variations do not penetrate a significant distance into the concrete shell to appreciably change the average temperature of the shell relative to the liner plate

   b. The number of cycles for this loading is 40 cycles for plant life of 40 years

2. Thermal cycling due to variation in the interior temperature of the containment during the heatup and cooldown of the reactor system in which the number of cycles is assumed to be 500 cycles for plant life of 40 years

3. Thermal cycling due to the loss of coolant accident is assumed to be one cycle.

Request

Evaluate the liner plate system for cyclic loading during period of extended operation consistent with UFSAR, section 3.8.1.5.4.B, requirements or provide additional technical basis to demonstrate this evaluation is not required.

APS Response to RAI 4.6-1

APS has evaluated the containment liner plate system for cyclic loading during the period of extended operation consistent with UFSAR, Section 3.8.1.5.4.B, requirements under Palo Verde Action Request (PVAR) 3137779. The evaluation contained the following conclusions:

1. The design-governing LOCA thermal loading (UFSAR 3.8.1.5.4, Item B.3) occurs only once in the plant life. Therefore, design to this criterion is not a TLAA for the liner.

2. Only the number of non-LOCA environmental and operational thermal load cycles (UFSAR 3.8.1.5.4, Items B.1 and B.2) would increase due to the proposed 60-year extended plant life.

3. The stresses and strains due to the assumed environmental summer-winter annual cycles (UFSAR 3.8.1.5.4, Item B.1) would be negligible owing to the insulation provided by the 3'-6" thick concrete containment wall, and will remain negligible on increase from 40 to 60 cycles for the proposed 60-year extended plant life.

4. The number of non-LOCA environmental and operational thermal load cycles is relatively small compared to the allowable number of cycles on the applicable fatigue curve in the ASME code, Section III, Figure I-9-1 for the non-LOCA design stresses or for the allowed three times the allowable stress intensity (S_M) value of the ASME code, Section III, Figure NE-3222-1 for secondary thermal stresses.

5. The assumed 500 containment interior operational heatup and cooldown cycles (UFSAR 3.8.1.5.4, Item B.2) corresponds to an average of 8⅓ cycles per year for a 60-year plant life, or a reactor system operational cooldown and heatup approximately every six weeks. This is extremely conservative and is more than adequate to accommodate the proposed 60-year extended plant life.

6. Based on the above, a fatigue evaluation or other time-dependent analysis (i.e., TLAA) of the containment liner for thermal cycles is not required since there will be negligible change in the fatigue resistance of the containment liner for the proposed 60-year extended plant life.

7. In addition, periodic inservice visual examination and leak-rate testing of the containment liner required by the plant Technical Specifications are performed in accordance with the requirements of PVNGS Containment Leakage Rate Testing Program to monitor and assure the continued inservice structural and leak-tight integrity of the containment liner through the proposed 60-year extended plant life.

Although this evaluation of the effect of these thermal cycles did not introduce a fatigue or a similar time-dependent analysis into the design and licensing basis, it evaluated the suitability of the containment liner based on assumptions that depend on the design lifetime. Therefore, it would be a TLAA if evaluated for the current 40-year licensed operating period. Since the design basis evaluation was based on a 60-year life, including the period of extended operation, it is valid for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(i).

The containment liner design documents have been revised to include the evaluation described above. In addition, PVAR 3451141 has been initiated to clarify UFSAR Section 3.8.1.5.4.B.

NRC RAI 4.7.8-1

Background:

Section 4.7.8 of the LRA provided details of a TLAA performed for building absolute or differential heave or settlement, including possible effects of changes in a perched groundwater lens. The purpose of this TLAA is to demonstrate that the assumptions for the building settlements used in the original design will remain valid for the period of extended operation.

Issue:

The first paragraph under "Current Settlement Monitoring Activities" on page 4.7-14, states that the Structures Monitoring Program monitors foundation responses and ground movement of the "major structures" on five-year intervals. A review of the applicant's Structures Monitoring Program, B2.1.32, showed that similar wording is included in the program description on page B-92. The applicant did not specify which structures would be monitored during the period of extended operation and how the inspection frequency will be adjusted as described in the UFSAR, Section 2.5.4.13, in the event post-construction settlement reaches 90 percent of the design criteria values.

Request:

Provide the following information:

a) List the structures included in the scope of 10 CFR 54.4 that will be monitored for the effects of settlement during the period of extended operation. In addition, provide a technical basis for excluding any structure that performs an intended function pursuant to 10 CFR 54.4 (a)(1), (a)(2), or (a)(3).

b) List the structures included in the scope of 10 CFR 54.4, that will be monitored on a different frequency or using different instrumentation than specified in the UFSAR, Section 2.5.4.13 and Table 2.5-19.

APS Response to RAI 4.7.8-1

Response (a)

All structures that are within the scope of license renewal in accordance with 10 CFR 54.4 (a)(1) or (a)(2) listed in LRA Table 2.2-1 are monitored for settlement consistent with the instrumentation and 5-year frequency specified in UFSAR Section 2.5.4.13 and Table 2.5-19. The 5-year frequency will be maintained during the period of extended operation unless more frequent monitoring is required based on monitoring results.

The Fire Water Pump House (part of Yard Structures), the Transformer Foundations (LRA Section 2.4.12), and the Station Blackout Generator structures are within the scope of license renewal in accordance with10 CFR 54.4 (a)(3). These structures are supported by reinforced concrete foundations on engineered backfill. With exception of the Transformer Foundations, these structures are located in the Water Reclamation Facility and have no interactions with Category 1 structures or safety related equipment. The Fire Water Pump House, the Transformer Foundations, and the Station Blackout Generator are not within the scope of the Settlement Monitoring described in UFSAR Section 2.5.4.13. No Palo Verde operating experience has indicated any degradation due to settlement in these structures, and the Structures Monitoring Program will continue to visually inspect them during the period of extended operation to confirm the absence of aging effects due to settlement. The Structures Monitoring Program will monitor the Fire Water Pump House, the Transformer Foundations, and the Station Blackout Generator structures for settlement on a 10-year frequency.

Response (b)

As noted in Response (a), the Fire Water Pump House, the Transformer Foundations, and the Station Blackout Generator are not within the scope of the Settlement Monitoring described in UFSAR Section 2.5.4.13. The Structures Monitoring Program will monitor the Fire Water Pump House, the Transformer Foundations, and the Station Blackout Generator structures for settlement on a 10-year frequency.

NRC RAI 4.7.8-2

Background:

The results of settlement monitoring program performed for PVNGS are summarized in Table 4.7-2 of the LRA.

Issue:

The post-construction differential settlement measured in 2003 between the Unit 2 auxiliary and the radwaste buildings exceeds the maximum allowable value of 0.5 inches by nearly 75 percent. In addition, post construction differential settlement in Units 1 and 3 between the auxiliary and the radwaste buildings is about 90 percent of the maximum estimated value.

Request:

a) Provide post-construction settlement and post-construction differential settlement data for the 1998 and 2008 inspections for the same locations for which the values are tabulated in Table 4.7-2. Include data for the marker between the radwaste and

control buildings where the differential settlement was measured in 2003 as 0.4332 inches.

b) Provide post-2003 settlement data for marker SM-31, including the data recorded with increased frequency.

c) Provide the corrective actions taken to address the impact of exceeding the maximum allowable post-construction differential settlement on Unit 2 structures and critical piping.

APS Response to RAI 4.7.8-2

Response (a): Table 4.7-2 data for 1997, 2003 and 2010

Post-construction settlement and post-construction differential settlement data is provided below for the 1997 and 2010 inspections for the same locations for which the 2003 values are tabulated in LRA Table 4.7-2. (The 5-year frequency of the measurements plus a 25% grace period allowed the 1998 measurements to be performed in 1997, and the 2008 measurements to be performed in 2010.)

Unit 1 Table - Settlement Monitoring Surveillance Results: Total Settlement and Differential Settlement

	Appendix D Criteria		Unit 1		
	Max	90%	1997	2003	2010
Post-Construction Settlement	1.5 in	1.35 in	1.2096 in	1.3092 in	1.3524 in *
Post-Construction Differential Settlement	0.5 in	0.45 in	0.4020 in	0.4476 in	0.4248 in

* Increased frequency testing to be performed as noted in UFSAR Section 2.5.4.13 (Palo Verde Action Request [PVAR] 3444868). Frequency of monitoring for these markers will be increased to an interval of 1 month. If no significant settlement occurs over a 3-month period, then the frequency of monitoring at those markers will be quarterly for a year, and then returned to the 5-year frequency in UFSAR Table 2.5-19.

Unit 2 Table - Settlement Monitoring Surveillance Results: Total Settlement and Differential Settlement

	Appendix D Criteria		Unit 2		
	Max	90%	1997	2003	2010
Post-Construction Settlement	1.5 in	1.35 in	1.1652 in	1.1784 in	1.2060 in
Post-Construction Differential Settlement	0.5 in	0.45 in	0.8556 in	0.8748 in	0.8616 in

Unit 3 Table - Settlement Monitoring Surveillance Results: Total Settlement and Differential Settlement

	Appendix D Criteria		Unit 3		
	Max	**90%**	**1997**	**2003**	**2010**
Post-Construction Settlement	1.5 in	1.35 in	0.8964 in	0.9132 in	0.9408 in
Post-Construction Differential Settlement	0.5 in	0.45 in	0.4368 in	0.4356 in	0.4224 in

The following table is also included for the marker between the radwaste and control buildings where the differential settlement was measured in 2003 from marker SM-32 as 0.4332 inches.

Unit 2 Table (SM-32) - Settlement Monitoring Surveillance Results: Differential Settlement between Radwaste and Control Buildings at SM-32

	Appendix D Criteria		Unit 2		
	Max	**90%**	**1997**	**2003**	**2010**
Post-Construction Differential Settlement	0.5 in	0.45 in	0.4308 in	0.4332 in	0.4464 in

Response (b): Post-2003 settlement data for marker SM-31

The "Post-Construction Settlement" row on the *Unit 2 Table - Settlement Monitoring Surveillance Results: Total Settlement and Differential Settlement* in Response (a) provides the post 2003 settlement data for settlement marker SM-31. See Response (c) for corrective actions associated with SM-31.

Response (c): Corrective Actions

As required by UFSAR Section 2.5.4.13, the frequency of settlement monitoring was increased to assess the impact of exceeding the maximum allowable post-construction differential settlement of Unit 2 radwaste building Marker SM-31. Excessive differential settlements of the radwaste structure occurred at the onset of the post construction period. The increased monitoring frequency verified that the condition remained unchanged, and the frequency was changed to a 5-year frequency in 1992. Since 1992, the radwaste structure has been monitored on a 5-year frequency and has not exhibited a trend of excessive settlement.

NRC RAI B2.1.33-1

Background:

Element 4 of the Generic Aging Lessons Learned (GALL) Report, AMP XI.S7, discusses performing inspections immediately following the occurrence of significant

natural phenomena such as large floods, earthquakes, hurricanes, tornadoes, intense local rainfalls, etc.

Issue:

"Aging Management Program Evaluation Report – Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants," states that PVNGS has no earthen dams or other water control structures in-scope for license renewal that would require inspections after the occurrence of significant natural phenomena.

Request:

Explain why it is unnecessary for the spray pond structures to be inspected after unusual natural events.

APS Response to RAI B2.1.33-1

Regulatory Guide 1.127, Section C.4.c, Special Inspections, states, "Special inspections should be performed immediately after the dam has passed unusually large floods and after the occurrence of significant earthquakes, hurricanes, tornadoes, intense local rainfalls, or other unusual events." This guidance is intended to prevent delayed, catastrophic failure of earthen dams and other large water impoundment structures that might be weakened by a severe event.

The reinforced concrete, Seismic Category I, spray pond structures are designed to remain functional after a Safe Shutdown Earthquake, extreme wind phenomena, and other design basis events. Palo Verde Technical Requirements Manual TLCO 3.3.103, Action C, requires a corrective action to be initiated to evaluate the magnitude, frequency spectrum, and resultant effect upon facility features important to safety following a seismic event greater than or equal to 0.02g. For other unusual natural events, PVNGS would enter the condition into the Corrective Action Program and assess the need to inspect the Spray Ponds.

NRC RAI B2.1.33-2

Background:

PVNGS includes two safety-related spray ponds for each unit.

Issue:

During the operating experience review, the applicant provided several condition reports which discussed degradation of the spray pond concrete walls. During walkdowns, the staff observed cracking and spalling near the top of the spray pond walls.

Request:

a) Explain how AMP B2.1.33 addresses degradation of the spray pond walls and how structural stability of the spray ponds will be maintained during the period of extended operation.

b) Discuss any plans to repair the current degradation prior to, or during, the period of extended operation.

APS Response to RAI B2.1.33-2

Response (a)

The inspections of the spray pond structures are within the scope of AMP B2.1.33, which is part of AMP B2.1.32, Structures Monitoring Program. This program manages cracking, loss of material, loss of bond, loss of strength, and increase in porosity and permeability of the spray pond structures due to extreme environmental conditions. These inspections are performed on a frequency of at least once every five years, and will continue throughout the period of extended operation.

Response (b)

The existing condition of the spray pond structures have been assessed and will be reworked prior to the Period of Extended Operation. Work Orders have been initiated to rework the existing conditions, and are being tracked in the PVNGS Corrective Action Program.

NRC RAI 3.1.1-1

Background:

Table 3.1.1 of the LRA, item 3.1.1-80, states that this line item is not applicable because PVNGS does not have cast austenitic stainless steel (CASS) reactor vessel internals. The UFSAR, Section 4.5.2.1, "Reactor Internals Materials," Subsection B on page 4.5-9, states that the upper guide structure assembly contains "ASTM A-351, Grade CF8" which is a CASS material.

Issue:

There is a discrepancy between the information from the LRA Table 3.1.1 and the applicant's UFSAR. It is not clear whether the reactor vessel internals contain CASS components.

Request:

Please resolve the discrepancy between the UFSAR, Section 4.5.2.1, which states the upper guide structure assembly contains CASS components, and Table 3.1.1, which states the reactor vessel internals do not contain CASS components. If the reactor vessel internals contain CASS components, provide the necessary revisions to the LRA.

APS Response to RAI 3.1.1-1

Palo Verde UFSAR Section 4.5.2.1 incorporated the related section from the Combustion Engineering Standard Safety Analysis Report (CESSAR), a historical document which, in some cases, reflects initial design information that did not become incorporated into the as-built Palo Verde design. A review of as-built information listed on the Reactor Internals Bills of Materials for the Palo Verde units confirmed no CASS material in the upper guide structure assembly. The Reactor Internals Bills of Materials were used as input to the license renewal aging evaluations. The resolution of the discrepancy in UFSAR Section 4.5.2.1 is being tracked under Palo Verde Action Request (PVAR) 3446697.

ENCLOSURE 2

Palo Verde Nuclear Generating Station
License Renewal Application Amendment No. 13

LRA Section	Page Nos.	RAI No.
Table 2.3.1-3	2.3-8	Add pressurizer spray head
Table 2.3.3-10	2.3-40	RAI 2.1-2 (Encl. 5)
2.3.3.30	2.3-82	RAI 2.1-2 (Encl. 5)
Table 2.3.3-30	2.3-83	RAI 2.1-2 (Encl. 5)
3.1.2.1.3	3.1-5	Add pressurizer spray head
3.1.2.2.16.2	3.1-13	Add pressurizer spray head
Table 3.1.1	3.1-26	Add pressurizer spray head
Table 3.1.2-3	3.1-84	Add pressurizer spray head
3.2.2.2.3	3.2-6	Add stainless steel containment. isolation piping
Table 3.2.1	3.2-11	Add stainless steel containment isolation piping
Table 3.2.2-4	3.2-41	Add stainless steel containment isolation piping
3.3.2.1.10	3.3-13, 14	RAI 2.1-2 (Encl. 5)
3.3.2.1.16	3.3-19	RAI 2.1-2 (Encl. 5)
3.3.2.1.23	3.3-27	RAI 2.1-2 (Encl. 5)
3.3.2.1.30	3.3-33	RAI 2.1-2 (Encl. 5)
Table 3.3.1	3.3-66	RAI 2.1-2 (Encl. 5)
Table 3.3.2-10	3.3-125, 128, 130, 135, 136, 137	RAI 2.1-2 (Encl. 5)
Table 3.3.2-16	3.3-161	RAI 2.1-2 (Encl. 5)
Table 3.3.2-23	3.3-208, 209	RAI 2.1-2 (Encl. 5)
Table 3.3.2-30	3.3-233, 236, 239, 240, 241, 242, 245	RAI 2.1-2 (Encl. 5)
A1.32*	A-18	RAI B2.1.32-1 (Encl. 3)
Table A4-1, Item 34	A-52	RAI B2.1.32-1 (Encl. 3)
Table A4-1, Item 53	A-59	RAI 4.5-1 (Encl. 1)
B2.1.10*	B-37, 38, 39, 40, 41, 42	RAI 2.1-2 (Encl. 5)
B2.1.17*	B-58, 59	RAI 2.1-2 (Encl. 5)
B2.1.32*	B-92, 93, 94	RAI B2.1.32-1 (Encl. 3)

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

Source: New item

Table 2.3.1-3, Pressurizer (page 2.3-8), is revised as follows (new text underlined):

Table 2.3.1-3 Pressurizer

Component Type	Intended Function
Closure Bolting	Pressure Boundary
PZR Heater Bundle Diaphragm Plate	Structural Support
PZR Heater Sheaths and Sleeves	Pressure Boundary
PZR Instrument Penetrations	Pressure Boundary
PZR Integral Support	Structural Support
PZR Lower Head	Pressure Boundary
PZR Manways and Covers	Pressure Boundary
PZR Nozzle Thermal Sleeves	Shelter, Protection
PZR Nozzles	Pressure Boundary
PZR Safe Ends	Pressure Boundary
PZR Shell and Upper Head	Pressure Boundary
PZR Spray Head	Spray

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5)

Table 2.3.3-10, Chemical and Volume Control System (page 2.3-40), is revised as follows (new text underlined, deleted text shown as strike through):

Table 2.3.3-10 Chemical Volume and Control System

Component Type	Intended Function
Accumulator	Leakage Boundary (Spatial) Pressure Boundary
Closure Bolting	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)
Compressible Joints/Seals	Direct Flow
Demineralizer	Pressure Boundary
Filter	Filter Leakage Boundary (Spatial) Pressure Boundary
Flow Element	Leakage Boundary (Spatial) Pressure Boundary
Flow Indicator	Leakage Boundary (Spatial) Structural Integrity (Attached)
Heat Exchanger (Boric Acid Concentrator)	Leakage Boundary (Spatial)
Heat Exchanger (Gas Stripper)	Leakage Boundary (Spatial)
Heat Exchanger (Letdown)	Pressure Boundary
Heat Exchanger (Regenerative)	Pressure Boundary
Heat Exchanger (Seal Injection)	Pressure Boundary Structural Support
Heater	Pressure Boundary
Insulation	Insulate (Mechanical)
Orifice	~~Leakage Boundary (Spatial)~~ Pressure Boundary Throttle
Piping	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)
Pump	Leakage Boundary (Spatial) Pressure Boundary
Sight Gauge	Leakage Boundary (Spatial)

Palo Verde Nuclear Generating Station
License Renewal Application
Amendment No. 13

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5)

Section 2.3.3.30, Miscellaneous Auxiliary Systems in-scope ONLY for Criterion 10 CFR 54.4(a)(2) (page 2.3-82), is revised as follows (new text underlined):

The license renewal drawings for the sanitary sewage and treatment system are listed below:
LR-PVNGS-ST-13-P-ZAE-204
LR-PVNGS-ST-13-P-ZAE-205
LR-PVNGS-ST-13-P-ZAE-209-01
LR-PVNGS-ST-13-P-ZJE-304
LR-PVNGS-ST-13-P-ZJE-207

The license renewal drawings for the secondary chemical control system are listed below:
LR-PVNGS-SC-01-M-SCP-005-01
LR-PVNGS-SC-01-M-SCP-006-01
LR-PVNGS-SC-01-M-SCP-006-02
LR-PVNGS-SC-01-M-SCP-006-03
LR-PVNGS-SC-01-M-SCP-006-04
LR-PVNGS-SG-01-M-SGP-002

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5)

Table 2.3.3-30, Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2) (page 2.3-83), is revised as follows (new text underlined):

Table 2.3.3-30 Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2)

Component Type	Intended Function
Accumulator	Leakage Boundary (Spatial)
Closure Bolting	Leakage Boundary (Spatial) Structural Integrity (Attached)
Filter	Leakage Boundary (Spatial)
Heat Exchanger (AS Condensate Vent Condenser)	Leakage Boundary (Spatial)
Heat Exchanger (Sample Cooler)	Leakage Boundary (Spatial)
Orifice	Leakage Boundary (Spatial)
Piping	Leakage Boundary (Spatial) Structural Integrity (Attached)
Pump	Leakage Boundary (Spatial)
Sight Gauge	Leakage Boundary (Spatial) Structural Integrity (Attached)
Strainer	Leakage Boundary (Spatial) Structural Integrity (Attached)
Tank	Leakage Boundary (Spatial)
Tubing	Leakage Boundary (Spatial)
Valve	Leakage Boundary (Spatial) Structural Integrity (Attached)

Source: New item

Section 3.1.2.1.3, Pressurizer (page 3.1-5), is revised as follows (new text underlined):

Aging Management Programs

The following aging management programs manage the aging effects for the pressurizer component types:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)
- Bolting Integrity (B2.1.7)
- Boric Acid Corrosion (B2.1.4)
- Nickel Alloy Aging Management (B2.1.34)
- One-Time Inspection (B2.1.16)
- Reactor Coolant System Supplement (B2.1.21)
- Water Chemistry (B2.1.2)

Source: New item

Section 3.1.2.2.16.2, Pressurizer spray head cracking (page 3.1-13), is revised as follows (new text underlined, deleted text struck-through):

3.1.2.2.16.2 Pressurizer spray head cracking

For managing the aging effect of cracking due to SCC and PWSCC of nickel alloy component of the pressurizer spray head exposed to reactor coolant, Water Chemistry (B2.1.2) will be augmented by a One-Time Inspection (B2.1.16).

The pressurizer spray head is not a pressure-retaining component and is not part of the reactor coolant pressure boundary. Therefore, the pressurizer spray head is not included in the PVNGS Alloy 600 Management Program. PVNGS complies with applicable NRC Orders and provides a commitment in the UFSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines. ~~Not applicable. PVNGS has determined that the pressurizer spray heads are not included in scope of license renewal, so the applicable NUREG-1801 line was not used.~~

Source: New item

Table 3.1.1, Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (page 3.1-26), is revised as follows (new text underlined, deleted text shown with strike through):

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.35	Steel with stainless steel or nickel alloy cladding primary side components; steam generator upper and lower heads, tubesheets and tube-to-tube sheet welds	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1) and Water Chemistry (B2.1.2) and for nickel alloy, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines (Reactor Coolant Supplement (B2.1.21)).	No	Not applicable. PVNGS has recirculating steam generators, so the applicable NUREG-1801 line was not used.
3.1.1.36	Nickel alloy, stainless steel pressurizer spray head	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) and, for nickel alloy welded spray heads, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines (Reactor Coolant Supplement (B2.1.21)).	No	Consistent with NUREG-1801.**See further evaluation in subsection 3.1.2.2.16.2.~~Not applicable. PVNGS has determined that the pressurizer spray heads are not included in scope of license renewal, so the applicable NUREG-1801 line was not used~~.

Source: New item

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer (page 3.1-84), is revised as follows (new text underlined):

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
PZR Shell and Upper Head	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
PZR Spray Head	SP	Nickel Alloys	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) and FSAR Commitment (B2.1.21)	IV.C2-17	3.1.1.36	A, 3
PZR Spray Head	SP	Nickel Alloys	Reactor Coolant (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) and FSAR Commitment (B2.1.21)	IV.C2-17	3.1.1.36	A, 3

Notes for Table 3.1.2-3:

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C *Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with* NUREG-1801 AMP.

E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.

G Environment not in NUREG-1801 for this component and material.

Plant Specific Notes:

1 Note E was used to include the plant specific AMP for nickel alloy aging management.

2 NUREG-1801 does not include air with borated water leakage for nickel alloy components. Similar to IV.E-3 for stainless steel, there are no aging effects for nickel alloy in air with borated water leakage

3. The pressurizer spray head is not a pressure-retaining component and is not part of the reactor coolant pressure boundary. Therefore, the pressurizer spray head is not included in the PVNGS Alloy 600 Management Program. PVNGS complies with applicable NRC Orders and provides a commitment in the UFSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.

Palo Verde Nuclear Generating Station
License Renewal Application
Amendment No. 13

Section 3.2.2.2.3, Loss of Material due to Pitting and Crevice Corrosion (page 3.2-6), is revised as follows (new text underlined and deleted text shown with strike through):

3.2.2.2.3 Loss of Material due to Pitting and Crevice Corrosion

3.2.2.2.3.1 Internal surfaces of stainless steel containment isolation piping and components exposed to treated water

The Water Chemistry Program (B2.1.2) and the One-Time Inspection Program (B2.1.16) will manage loss of material due to pitting and crevice corrosion for stainless steel components exposed to demineralized water. The One-Time Inspection Program (B2.1.16) will include selected components at susceptible locations where contaminants could accumulate (e.g., stagnant flow locations).~~Not applicable. PVNGS has no in-scope stainless steel components exposed to treated water in the engineered safety features systems, so the applicable NUREG-1801 line was not used.~~

Table 3.2.1, Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (page 3.2-11), is revised as follows (new text underlined and deleted text shown with strike through):

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.03	Stainless steel containment isolation piping and components internal surfaces exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801. See further evaluation in subsection 3.2.2.2.3.~~Not applicable. PVNGS has no in-scope stainless steel components exposed to treated water in the engineered safety features systems, so the applicable NUREG-1801 line was not used.~~

Palo Verde Nuclear Generating Station
License Renewal Application
Amendment No. 13

Table 3.2.2-4, Engineered Safety Features – Summary of Aging Management Evaluation – Safety Injection and Shutdown Cooling System (page 3.2-41), is revised as follows (new text underlined and deleted text shown with strike through):

Table 3.2.2-4 Engineered Safety Features – Summary of Aging Management Evaluation – Safety Injection and Shutdown Cooling System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	~~VIII.E-29~~ V.C-4	~~3.4.1.16~~ 3.2.1.03	A

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5)

Section 3.3.2.1.10 (page 3.3-13), is revised as follows (new text underlined):

3.3.2.1.10 Chemical and Volume Control System

Materials

The materials of construction for the chemical and volume control system component types are:

- Carbon Steel
- Cast Iron
- Cast Iron (Gray Cast Iron)
- Elastomer
- Glass
- Insulation Calcium Silicate
- Insulation Mineral Wool
- Nickel Alloys
- Stainless Steel
- Stainless Steel Cast Austenitic

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5)

Section 3.3.2.1.10 (page 3.3-14), is revised as follows (new text underlined):

Aging Management Programs

The following aging management programs manage the aging effects for the chemical and volume control system component types:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)
- Bolting Integrity (B2.1.7)
- Boric Acid Corrosion (B2.1.4)
- Buried Piping and Tanks Inspection (B2.1.18)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- Nickel Alloy Aging Management (B2.1.34)
- One-Time Inspection (B2.1.16)
- One-Time Inspection Of ASME Code Class 1 Small-Bore Piping (B2.1.19)
- Reactor Coolant System Supplement (B2.1.21)
- Selective Leaching of Materials (B2.1.17)
- Water Chemistry (B2.1.2)

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5)

Section 3.3.2.1.16 Radwaste Building HVAC System (page 3.3-19), is revised as follows (new text underlined):

Materials

The materials of construction for the radwaste building HVAC system component types are:

- Carbon Steel
- Carbon Steel (Galvanized)
- Copper Alloy

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5)

Section 3.3.2.1.23, Demineralized Water System (page 3.3-27), is revised as follows (new text underlined):

3.3.2.1.23 Demineralized Water System

Materials

The materials of construction for the demineralized water system component types are:

- Carbon Steel
- Stainless Steel
- Thermoplastic

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5)

3.3.2.1.30, Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2) (page 3.3-33), is revised as follows (new text underlined):

Materials

The materials of construction for the miscellaneous auxiliary systems in-scope ONLY based on Criterion 10 CFR 54.4(a) (2) component types are:

- Carbon Steel
- Carbon Steel with Elastomer Lining
- Cast Iron
- Cast Iron (Gray Cast Iron)
- Copper Alloy
- Copper Alloy (Brass Copper < 85%)
- Glass
- Polyvinyl Chloride (PVC)
- Stainless Steel

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5)

Table 3.3.1, Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (page 3.3-66), is revised as follows (new text underlined):

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.76	Steel piping, piping components, and piping elements (without lining/coating or with degraded lining/coating) exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, fouling, and lining/coating degradation	Open-Cycle Cooling Water System (B.2.1.9)	No	Consistent with NUREG-1801 for all components except that a different aging management program is credited for piping and piping components in the ~~secondary~~ chemical waste, oily waste and radioactive waste drain systems. The aging of component internal surfaces exposed to the raw water environment of the ~~secondary~~ chemical waste, oily waste and radioactive waste drain systems will be managed by Inspection Of Internal Surfaces in Miscellaneous Piping And Ducting Components (B2.1.22). The aging of component external surfaces exposed to the raw water environment of the oily waste system will be managed by External Surfaces Monitoring Program (B2.1.20).

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5)

Table 3.3.2-10, Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (page 3.3-125), is revised as follows (new text underlined):

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter	LBS	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-34	3.4.1.04	A

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5) (continued)

Table 3.3.2-10, Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (page 3.3-128), is revised as follows (new text underlined):

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Gas Stripper)	LBS	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-1	3.3.1.48	B
Heat Exchanger (Gas Stripper)	LBS	Carbon Steel	Plant Indoor Air (Ext))	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-8	3.3.1.59	B
Heat Exchanger (Gas Stripper)	LBS	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E-34	3.4.1.04	A
Heat Exchanger (Gas Stripper)	LBS	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Heat Exchanger (Gas Stripper)	LBS	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-5	3.3.1.08	E, 3
Heat Exchanger (Gas Stripper)	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2)	VII.A3-8	3.3.1.91	A

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5) (continued)

Table 3.3.2-10, Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (page 3.3-130) is revised as follows (new text underlined, deleted text shown with strike through):

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Orifice	~~LBS~~ PB	Stainless Steel Cast Austenitic	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	LBS	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Piping	LBS	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-34	3.4.1.04	A

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5) (continued)

Table 3.3.2-10, Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (page 3.3-135), is revised as follows (new text underlined):

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5) (continued)

Table 3.3.2-10, Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (page 3.3-136), is revised as follows (new text underlined):

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS	Cast Iron (Gray Cast Iron)	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	LBS	Cast Iron (Gray Cast Iron)	Secondary Water (Int)	Loss of material	Selective Leaching of Materials (B2.1.17)	VII.F2-16	3.3.1.85	B
Valve	LBS	Cast Iron (Gray Cast Iron)	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-34	3.4.1.04	A

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5) (continued)

Table 3.3.2-10, Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (page 3.3-137), is revised as follows (new text underlined):

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS, PB	Stainless Steel Cast Austenitic	Wetted Gas (Int)	Loss of material	Inspection Of Internal Surfaces In Miscellaneous Piping And Ducting Components (B2.1.22)	V.D1-29	3.2.1.08	E

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5)

Table 3.3.2-16 Auxiliary Systems – Summary of Aging Management Evaluation – Radwaste Building HVAC System (page 3.3-161), is revised as follows (new text underlined):

Table 3.3.2-16 Auxiliary Systems – Summary of Aging Management Evaluation – Radwaste Building HVAC System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS	Copper Alloy	Wetted Gas (Int)	Loss of material	Inspection Of Internal Surfaces In Miscellaneous Piping And Ducting Components (B2.1.22)	VII.G-9	3.3.1.28	E

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5)

Table 3.3.2-23, Auxiliary Systems – Summary of Aging Management Evaluation – Demineralized Water System (page 3.3-208), is revised as follows (new text underlined):

Table 3.3.2-23 Auxiliary Systems – Summary of Aging Management Evaluation – Demineralized Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Demineralizer	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Demineralizer	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Demineralizer	LBS	Thermoplastics	Demineralized Water (Int)	None	None	None	None	F, 3
Demineralizer	LBS	Thermoplastics	Plant Indoor Air (Ext)	None	None	None	None	F, 4

Table 3.3.2-23, Auxiliary Systems – Summary of Aging Management Evaluation – Demineralized Water System (page 3.3-209), is revised as follows (new text underlined):

Notes for Table 3.3.2-23:

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

G Environment not in NUREG-1801 for this component and material.

Plant Specific Notes:

1 Loss of Preload is considered to be applicable for all closure bolting.

2 The PVNGS plant outdoor environment is not subject to aggressive contaminants or saline environment. Stainless steel does not experience any appreciable aging effects in this environment.

3 Thermoplastic in a treated water environment is relatively unaffected by water, concentrated alkalis, and non-oxidizing acids, oils, and ozone.

4 Thermoplastic in an air environment is relatively unaffected by water, concentrated alkalis, and non-oxidizing acids, oils, and ozone.

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5)

Table 3.3.2-30, Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2) (page 3.3-233), is revised as follows (new text underlined):

Table 3.3.2-30 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Accumulator	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Accumulator	LBS	Carbon Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 2

Table 3.3.2-30, Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2) (page 3.3-236), is revised as follows (new text underlined):

Table 3.3.2-30 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.F-25	3.4.1.04	A

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5) (continued)

Table 3.3.2-30, Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2) (page 3.3-239), is revised as follows (new text underlined and deleted text shown as strike through):

Table 3.3.2-30 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Pump	LBS	Carbon Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 2
Pump	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Pump	LBS	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces In Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2
~~Sight Gauge~~	~~LBS~~	~~Glass~~	~~Borated Water Leakage (Ext)~~	~~None~~	~~None~~	~~None~~	~~None~~	~~G~~
~~Sight Gauge~~	~~LBS~~	~~Glass~~	~~Treated Borated Water (Int)~~	~~None~~	~~None~~	~~V.F-9~~	~~3.2.1.52~~	~~A~~

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5) (continued)

Table 3.3.2-30, Auxiliary Systems – Summary of Aging Management Evaluation –Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2) (page 3.3-240), is revised as follows (deleted text shown as strike through):

Table 3.3.2-30 Auxiliary Systems – Summary of Aging Management Evaluation - Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
~~Sight Gauge~~	~~LBS~~	~~Stainless Steel~~	~~Borated Water Leakage (Ext)~~	~~None~~	~~None~~	~~V.F-13~~	~~3.2.1.57~~	~~A~~
~~Sight Gauge~~	~~LBS~~	~~Stainless Steel~~	~~Treated Borated Water (Int)~~	~~Loss of material~~	~~Water Chemistry (B2.1.2)~~	~~V.A-27~~	~~3.2.1.49~~	~~A~~

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5) (continued)

Table 3.3.2-30, Auxiliary Systems – Summary of Aging Management Evaluation –Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2) (page 3.3-241), is revised as follows (new text underlined):

Table 3.3.2-30 Auxiliary Systems – Summary of Aging Management Evaluation - Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tank	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Tank	LBS	Stainless Steel	Raw Water (Int)	Loss of material	Inspection Of Internal Surfaces In Miscellaneous Piping And Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2
Tank	LBS	Stainless Steel	Wetted Gas (Int)	Loss of material	Inspection Of Internal Surfaces In Miscellaneous Piping And Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Tubing	LBS	Polyvinyl Chloride (PVC)	Plant Indoor Air (Ext)	None	None	None	None	F, 3
Tubing	LBS	Polyvinyl Chloride (PVC)	Secondary Water (Int)	None	None	None	None	F, 4
Tubing	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Tubing	LBS	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.F-23	3.4.1.16	A
Tubing	LBS	Stainless Steel	Secondary Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.F-24	3.4.1.14	A

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5) (continued)

Table 3.3.2-30, Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2) (page 3.3-242), is revised as follows (new text underlined):

Table 3.3.2-30 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.F-25	3.4.1.04	A

Source: Supplemental response to RAI 2.1-2 (see Enclosure 5) (continued)

Table 3.3.2-30, Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Auxiliary Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2) (page 3.3-245), is revised as follows (new text underlined):

Notes for Table 3.3.2-30:

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

Plant Specific Notes:

1 Loss of Preload is considered to be applicable for all closure bolting.

2 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22) is credited instead of Open-Cycle Cooling Water System program (B2.1.9) for aging management of the components of solid radwaste system, sanitary drains and treatment, chemical waste, oily waste systems.

3 PVC in an indoor air environment is relatively unaffected by water, concentrated alkalis, and non-oxidizing acids, oils and ozone.

4 PVC in a secondary water environment is relatively unaffected by water, concentrated alkalis, and non-oxidizing acids, oils and ozone.

A1.32 STRUCTURES MONITORING PROGRAM

The Structures Monitoring Program manages the cracking, loss of material, and change in material properties by monitoring the condition of structures and structural supports that are within the scope of license renewal. The Structures Monitoring Program implements the requirements of 10 CFR 50.65 and is consistent with the guidance of NUMARC 93-01, Revision 2 and Regulatory Guide 1.160, Revision 2.

The Structures Monitoring Program provides inspection guidelines for concrete elements, structural steel, masonry walls, structural features (e.g., caulking, sealants, roofs, etc.), structural supports, and miscellaneous components such as doors. The Structures Monitoring Program includes all masonry walls and water-control structures within the scope of license renewal. The Structures Monitoring Program also monitors settlement for each major structure and inspects supports for equipment, piping, conduit, cable tray, HVAC, and instrument components.

Prior to the period of extended operation:

The Structures Monitoring Program will be enhanced to define the specific criteria for categorizing deficiencies for concrete inspections.

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.

The Structures Monitoring Program will be enhanced to inspect structures within the scope of license renewal within a 10-year period.

Table A4-1 License Renewal Commitments

Item No.	Commitment	LRA Section	Implementation Schedule
34	Existing Structures Monitoring Program is credited for license renewal, AND Prior to the period of extended operation: • The Structures Monitoring Program will be enhanced to define the specific criteria for categorizing deficiencies for concrete inspections. • 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. • The Structures Monitoring Program will be enhanced to inspect structures within the scope of license renewal within a 10-year period. (RCTSAI 3246927)	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
53	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. (RCTSAI 3429933)	Response to RAI 4.5-1 in APS letter no. 102-06160, dated 4/1/10.	5/28/10

B2.1.10 Closed-Cycle Cooling Water System

Program Description

The Closed-Cycle Cooling Water (CCCW) System program manages loss of material, cracking, and reduction in heat transfer for components in the following closed cycle cooling water systems:

- Diesel Generator Jacket Water System
- Essential Chilled Water System
- Essential Cooling Water System
- Normal Chilled Water System
- Nuclear Cooling Water System

The CCCW systems serve heat exchangers and related components that are within the scope of license renewal in the following interfacing systems:

- Auxiliary Steam System
- Chemical and Volume Control System
- Spent Fuel Pool Cooling and Clean Up System
- Reactor Coolant System
- Secondary Chemical Control System
- Safety Injection and Shutdown Cooling System
- Nuclear Sampling System
- Auxiliary Building HVAC
- Containment Building HVAC
- Control Building HVAC

The program includes (a) maintenance of system corrosion inhibitor concentrations to minimize aging effects and (b) periodic testing and inspections to evaluate system and component performance. The water chemistry aspect of the program maintains an environment within CCCW systems that is consistent with the parameters specified in EPRI TR-107396 for CCCW system. Water chemistry is maintained through the addition of an

iron corrosion inhibitor (nitrite), a copper corrosion inhibitor (tolyltriazole - TTA), pH control and biocide (glutaraldehyde). System corrosion inhibitor concentrations are maintained at levels described in EPRI TR-107396 to minimize aging effects. Testing and inspections are performed in accordance with guidance in EPRI TR 107396 for closed-cycle cooling water (CCCW) systems as appropriate for their license renewal intended functions; for example, components which do not have a license renewal heat transfer function, but which are evaluated as having a license renewal intended function of pressure boundary or leakage barrier are not subject to internal inspection or performance testing. The effectiveness of water chemistry control measures of these heat exchangers is verified by visual inspection of the internal surfaces of selected components fabricated of similar materials and exposed to closed-cycle water using the same corrosion inhibitor program. Inspection processes include visual, eddy-current and ultrasonic methods. Testing methods include functional demonstrations and monitoring, thermal and hydraulic performance testing.

NUREG-1801 Consistency

The Closed-Cycle Cooling Water System program is an existing program that, following enhancement, will be consistent with exception to NUREG-1801, Section XI.M21, "Closed-Cycle Cooling Water."

Exceptions to NUREG-1801

Program Elements Affected

Preventive Actions - Element 2

NUREG-1801, Section XI.M21, Element 2, requires materials used in CCCW systems to be appropriate to the type of service. The essential cooling water system for each unit is provided with two radiation monitors (one per train) that employ an aluminum "window" as a pressure boundary between the CCCW and the ionization detector within the flow-through sample chambers. The chemical treatment program at PVNGS does not include controls described in EPRI TR-107396 as appropriate for aluminum. Exception is taken to employ the NUREG 1801 AMP XI.M38 Internal Surfaces Monitoring Program to manage the aging of the aluminum "windows" of the radiation monitors. A review of plant operating experience reveals no instances where aging effects have led to the loss of the intended function of the subject components.

Parameters Monitored or Inspected - Element 3 and Monitoring and Trending – Element 5

NUREG-1801, Section XI.M21, Element 3 requires testing and inspection as described in EPRI TR-107396 and further states "For pumps, the parameters monitored include flow, discharge pressures, and suction pressures and for heat exchangers, the parameters monitored include flow, inlet and outlet temperatures, and differential pressure" and Element 5 states "visual inspections and performance/functional tests are to be performed to confirm the effectiveness of the program." PVNGS monitors system parameters and performs a combination of visual inspections, non-destructive evaluations, performance and functional tests as well as thermal performance tests as described in EPRI TR-107396 Section 8.4 to confirm the effectiveness of the CCCW program in managing the aging of components and

systems exposed to CCCW. Plant configuration constraints and consideration of components which do not have a license renewal heat transfer function, but which are evaluated as having a license renewal intended function of pressure boundary or leakage barrier have led to several exceptions with respect to some measures set forth in NUREG-1801 with respect to testing and inspection specifics that together do not compromise the ability to monitor program effectiveness to ensure the component intended functions are maintained. Specific exceptions taken include:

a.) The essential cooling water, spent fuel cooling and cleanup, and shutdown cooling heat exchangers are not monitored for differential pressure. The program of periodic sampling and maintenance of system chemistry together with thermal performance testing in conformance with EPRI NR-7552, and, in the case of the essential cooling water heat exchanger, periodic ECT of the heat exchanger tubes and, in the case of the spent fuel cooling and cleanup heat exchanger, periodic NDE of the heat exchanger shell are adequate to ensure that component intended functions of pressure boundary and heat transfer are maintained.

b.) The essential chilled water and essential cooling water system circulating water pumps are not subject to periodic internal visual inspection or casing NDE. These pumps are monitored for flow, suction pressure and discharge pressure in accordance with the approved ASME Pump and Valve In-Service Testing Program. The performance monitoring of these pumps together with periodic sampling and control of water chemistry is adequate to ensure component intended function is maintained.

c.) The essential chilled water system chiller condenser, water cooler and lube oil cooler are not individually monitored for flow, inlet and outlet temperatures, and differential pressure. During periodic surveillance testing, the heat load on the essential chilled water system is not reproducible from test-to-test. Plant procedures require that these components are subject to visual inspection when their respective chiller is rebuilt. Visual inspection together with the periodic sampling and control of system water chemistry is adequate to ensure the component intended functions are maintained.

d.) The individual ventilation cooling coils served by the essential chilled water system are not monitored for differential pressure and, additionally are not subject to visual inspection of their internal surfaces or NDE because the internal diameter and geometry of the coils preclude effective internal inspection. The combination of chemistry control, preventive maintenance, air side inspection, and testing of a control room air filtration unit in each train provides reasonable assurance that essential auxiliary building HVAC and control building HVAC system cooling coil performance has not degraded. A review of plant operating experience reveals no instances where aging effects have led to the loss of the intended function of the subject components.

e.) The diesel generator jacket water engine-driven circulating water pump, the motor-driven circulating water pump, the jacket water heat exchanger, turbo air intercooler, turbocharger and governor lube oil cooler are not individually monitored for flow, inlet and outlet temperatures, and differential pressure and internal visual inspections are not performed on each component. At PVNGS, diesel generator performance parameters are monitored through periodic Technical Specification surveillance tests. Plant procedures require

temperature and pressure parameters be compared to pre-established limiting values. From the comparison, overall heat exchanger and pump performance can be inferred collectively for the diesel generator under test. With respect to the motor-driven circulating water pump, the pump operates cyclically together with a heater to maintain jacket water temperature when the diesel generator is in standby; its functional performance is continuously monitored by measuring jacket water temperature. The diesel generator governor oil cooler, the engine-driven and motor-driven circulating water pumps and the turbocharger are not individually subject to periodic visual inspection. The jacket water heat exchanger and the turbo air intercooler are periodically inspected visually as an indication of interior surface conditions throughout the diesel generator jacket water system. The surveillance tests together with periodic visual inspections and the periodic sampling and control of system water chemistry are adequate to ensure the component intended functions are maintained within the diesel generator jacket water system.

f.) The RC hot leg sample cooler is within scope of license renewal for 10CFR54.4 criteria a(3) fire protection considerations that identify the capability to obtain a RC hot leg sample for boron concentration as a means of reactivity control. Exception is taken for regular, periodic inspection and testing of this heat exchanger based on its variable heat load and on the fact that the design configuration of the RC hot leg sample cooler is a sealed unit not subject to opening for routine inspection or maintenance. The effectiveness of water chemistry control measures for this heat exchanger is verified by visual inspection of the internal surfaces of selected components fabricated of similar materials and exposed to closed-cycle cooling water using the same corrosion inhibitor program.

g.) Several heat exchangers are provided which do not have a license renewal heat transfer intended function and are not monitored for parameters pertaining to heat transfer nor subject to periodic performance monitoring and inspection to manage the aging effect of reduction in heat transfer. These heat exchangers include the letdown heat exchanger, which has the intended function of pressure boundary, and the following heat exchangers, which have the intended function of leakage barrier - spatial:

- auxiliary steam vent condenser
- cooler for auxiliary steam radiation monitor
- aftercooler for gas stripper
- cooling coils for normal HVAC Units (containment, auxiliary, and control building HVAC).
- steam generator hot leg, cold leg and downcomer blowdown sample coolers
- pressurizer steam space and surge line sample coolers
- safety injection sample coolers

The effectiveness of water chemistry control measures for these heat exchangers is verified by visual inspection of the internal surfaces of selected components fabricated of similar

materials and exposed to closed-cycle cooling water using the same corrosion inhibitor program.

Enhancements

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

Preventive Actions - Element 2, Acceptance Criteria – Element 6, and Acceptance Criteria – Element 7

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.

Operating Experience

A review of the PVNGS plant-specific operating experience indicates that there has been no evidence of significant fouling or loss of material that has resulted in a loss of intended function observed in the following closed cycle cooling systems:

- Diesel Generator Jacket Water System
- Essential Chilled Water System
- Essential Cooling Water System
- Normal Chilled Water System
- Nuclear Cooling Water System

During the second half of 2001, water chemistry monitoring identified an elevated levels of chlorides and sulfates characteristic of leakage from the essential spray pond system into the essential cooling water system of Unit 3. Diagnostic water chemistry testing further localized the source of the leak to the B-train essential cooling water heat exchanger. Visual inspection and Non-Destructive Evaluation (eddy current testing) were performed and localized the leak to a heat exchanger tube which was subsequently plugged. The cause was evaluated as a pit resulting from corrosion from the open-cycle cooling side of the heat exchanger into the closed-cycle side of the heat exchanger. An expanded testing program encompassing 100% of the essential cooling water heat exchanger tubes in all three units revealed no further degradation. This event demonstrates the effectiveness of managing the aging of the closed-cycle cooling water systems.

Conclusion

The continued implementation of the Closed-Cycle Cooling Water 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.

B2.1.17 Selective Leaching of Materials

Program Description

The Selective Leaching of Materials program manages the loss of material due to selective leaching for copper alloy >15% zinc (brass), copper alloy >8% aluminum (aluminum-bronze), and gray cast iron components exposed to closed-cycle cooling water, demineralized water, secondary water, raw water and wetted gas within the scope of license renewal. Components susceptible to selective leaching are in the auxiliary steam, chemical and volume control, diesel generator, essential chilled water, essential spray ponds, and fire protection systems.

A one-time inspection of a selected sample of components internal surfaces is performed. Visual and/or mechanical methods determine whether loss of material due to selective leaching is occurring. If these inspections detect dezincification, de-alloying, or graphitization, which are indications of selective leaching, then a follow-up examination/evaluation is performed. The examination/evaluation may require confirmation of selective leaching with a metallurgical evaluation which may include microstructure examination. The sample size of the system/material/environment combination may be expanded based on the results of the evaluation and testing. If indications of selective leaching are confirmed, follow up examinations/evaluations are performed.

NUREG-1801 Consistency

The Selective Leaching of Materials program is an existing program that is consistent with exception to NUREG-1801, Section XI.M33, "Selective Leaching of Materials".

Exceptions to NUREG-1801

Program Elements Affected

Scope of Program – Element 1, Preventive Actions – Element 2, Parameters Monitored or Inspected – Element 3, and Detection of Aging Effects – Element 4

NUREG-1801, Section XI.M33 recommends hardness testing of sample components in addition to visual inspections. However, a qualitative determination of selective leaching is used in lieu of Brinell hardness testing for components within the scope of the PVNGS Selective Leaching of Materials program. The exception involves the use of examinations, other than Brinell hardness testing identified in NUREG-1801 to identify the presence of selective leaching of materials. The exception is justified, because (1) hardness testing may not be feasible for most components due to form and configuration and (2) other mechanical means, e.g., scraping, or chipping, provide an equally valid means of identification.

Additionally, hardness testing only provides definitive results if baseline values are available for comparison purposes. Specific material contents for copper alloys may not be known and gray cast irons may not have published hardness numbers. Without specific numbers for comparison, hardness testing would yield unusable results. In lieu

of hardness testing, visual and mechanical inspections are performed on a sampling of components constructed of copper alloys (>15% zinc and >8% aluminum) and gray cast iron from various station system environments. Follow-up examinations or evaluations are performed on component material samples where indications of dezincification, de-alloying, or graphitization are visually detected and additional analysis as part of the engineering evaluation is required. The engineering evaluation may require confirmation with a metallurgical evaluation (which may include a microstructure examination).

Enhancements

None

Operating Experience

The accelerated de-alloying of aluminum-bronze (copper alloy >8% aluminum), caused by Microbiologically Induced Corrosion (MIC), which was the subject of Information Notice 94-59 regarding selective leaching, is documented. The PVNGS open-cycle cooling water systems are chemically treated with biocides to prevent the growth of MIC causing bacteria and systems, not in continuous use, are recirculated periodically to ensure adequate chemical mixing is maintained.

Conclusion

The continued implementation of the Selective Leaching of Materials 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.

B2.1.32 Structures Monitoring Program

Program Description

The Structures Monitoring Program manages cracking, loss of material, and change in material properties by monitoring the condition of structures and structural supports that are within the scope of license renewal. The program implements the requirements of 10 CFR 50.65 (Maintenance Rule) and is consistent with the guidance of NUMARC 93-01, Rev 2 and Regulatory Guide 1.160, Rev. 2. The Structures Monitoring Program provides inspection guidelines and walkdown checklists for concrete elements, structural steel, masonry walls, structural features (e.g. caulking, sealants, roofs, etc.), structural supports, and miscellaneous components such as doors. The scope of the Structures Monitoring Program includes all masonry walls and water-control structures within the scope of license renewal. The program also monitors settlement for each major structure and inspects supports for equipment, piping, conduit, cable tray, HVAC, and instrument components. The scope of the Structures Monitoring Program does not include the inspection of the supports specifically inspected per the requirements of the ASME Section XI In-Service Inspection Program. Though coatings may have been applied to the external surfaces of structural members, no credit was taken for these coatings in the determination of aging effects for the underlying materials. The Structures Monitoring Program evaluates the condition of the coatings as an indication of the condition of the underlying materials.

Periodic inspections required by the Structures Monitoring Program are performed and documented per plant procedures. Initial baseline inspections under the Structures Monitoring Program were performed from June 1994 to June 1996. Each of the spray ponds is inspected every five years, and settlement monitoring surveillance is performed for each major structure every five years. ~~For other inspections, representative SSCs are monitored at each of the three units, such that the equivalent of one complete unit is inspected every 10 years. All three units will be 100% inspected (with the possible exception of inaccessible areas) within a 30-year period.~~ Prior to the period of extended operation, the Structures Monitoring Program will be enhanced to inspect structures within the scope of license renewal within a 10-year period

NUREG-1801 Consistency

The Structures Monitoring Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S6, "Structures Monitoring Program".

Exceptions to NUREG-1801

None

Enhancements

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

Detection of Aging Effects – Element 4

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.

The Structures Monitoring Program will be enhanced to inspect structures within the scope of license renewal within a 10-year period.

Acceptance Criteria - Element 6

The Structures Monitoring Program will be enhanced to define the specific criteria for categorizing deficiencies for concrete inspections.

Operating Experience

Miscellaneous openings and gaps in barriers that may impact the environmental equipment qualifications at PVNGS were reviewed and all identified deficiencies were corrected in accordance with NRC Information Notice IN 95-52 "*Barrier and Seals between Harsh Environments*".

NRC Information Notice IN 2002-12 "*Submerged Safety-Related Electrical Cables*" identified several failures and weaknesses associated with protracted submergence in water of electrical cables that feed safety-related equipment. Significant amounts of water have been found in various manholes and the entry is from an unknown source. The intrusion of water into the manholes is being effectively controlled through a pumping program.

NRC Information Notice IN 2003-08 "*Potential Flooding through Unsealed Concrete Floor Cracks*" identified failures involving flooding of rooms containing safety-related panels and equipment as a result of fire water seepage through unsealed concrete floor cracks. No through cracking has been identified at PVNGS and the program has been revised to provide guidance for the identification of through wall cracks in flood barriers in the future.

NRC Information Notice IN 2005-11, "*Internal Flooding/Spray-Down of Safety-Related Equipment Due to Unsealed Equipment Hatch Floor Plugs and/or Blocked Floor Drains*" identified the possibility of flooding safety-related equipment as a result of (1) equipment hatch floor plugs that are not water tight and (2) blockage of equipment floor drain systems that are credited to mitigate the effects of flooding. All hatches/plugs that are credited as

flood barriers are water tight. Instructions were developed to provide removal and reinstallation instructions for hatches and plugs to maintain the required seals.

Adverse and critical conditions were found on the roof of Unit 1's Turbine Building. These conditions included punctured membrane and rigid insulation, deteriorated tar patches with mesh reinforcement exposed, damaged flashing exposing the roof membrane seal, raised blisters/raised areas in the membrane, several long areas of damaged flashing, and large cracks through the roof membrane into the rigid insulation. The large cracks and large blister/raised areas in the roof membrane are significant leakage paths and classify the condition of the roof at Elevation 240' as critical. A previously issued CRDR addressed the concern that in inclement weather the Turbine building had experienced consistent and dependable flooding, which had caused equipment failure. To address these concerns Unit 1's Turbine Building roof was replaced. Unit 2 and 3's Turbine Building roofs have been previously replaced.

Conclusion

The continued implementation of the Structures Monitoring 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.

Enclosure 3

Supplemental Response to RAI B2.1.32-1, Structures Monitoring Program

NRC RAI B2.1.32-1

Background:

Industry standards (e.g., ACI 349.3R-96) identified in the GALL Report Structures Monitoring Program suggest a five-year inspection frequency for structures exposed to natural environment, structures inside primary containment, continuous fluid-exposed structures, and structures retaining fluid or pressure, and a ten-year inspection frequency for below-grade structures and structures in a controlled interior environment.

Issue:

Element 4 of the applicant's Structures Monitoring Program states that inspections include SSCs that are identified for each topical area with frequencies that provide assurance that selected SSCs will not degrade or drastically change their ability to protect or support safety systems or components. The monitoring is scheduled to result in total observation of all systems on a frequency of approximately 10 years. To include a cross section of all three units, observations are conducted in different areas of different units. This ensures that within a thirty-year cycle, all units are monitored and all areas of each unit are monitored. It is not clear to the staff that all SSC's at each unit inspected under this AMP are in compliance with the industry standards inspection frequency (e.g., as noted in ACI 349.3R-96).

Request:

Please explain in more detail the inspection frequency for each unit and the plant in general. If the inspection interval exceeds the industry standard, clearly explain the basis for extending the interval and explain how the chosen interval will adequately manage aging during the period of extended operation.

APS Supplemental Response to RAI B2.1.32-1

(This response replaces the RAI B2.1.32-1 response provided in APS letter no. 102-06134, dated February 19, 2010)

As shown in LRA Amendment 13 in Enclosure 2, LRA Sections A1.32 and B2.1.32, and Commitment No. 34 in Table A4-1, have been revised to state that prior to the period of extended operation, the Palo Verde Structures Monitoring Program will be enhanced to inspect structures within the scope of license renewal at intervals not to exceed 10 years. This will ensure consistency with the general guidance of ACI 349.3R-96 Chapter 6 for frequency of inspection. The current inspection frequency for spray ponds will remain at five years. The current frequency of the settlement monitoring surveillance for each major structure will also remain at five years.

ACI 349.3R-96 Chapter 6 states, "The frequency at which periodic evaluations are conducted within the evaluation procedure should be defined by the plant owner," and

"Frequencies should be based on the aggressiveness of environmental conditions and physical conditions of the plant structures," and "In general, it is recommended that all safety-related structures be visually inspected at intervals not to exceed 10 years." ACI 349.3R-96 Chapter 6 also states, "In addition, the frequency of inspection for other components should follow those in the table below." The table lists structures exposed to natural environment, structures inside primary containment, continuous fluid-exposed structures and structures retaining fluid and pressure with a 5-year inspection frequency.

Palo Verde will be consistent with the general guidance of ACI 349.3R-96 Chapter 6 to visually inspect all structures at intervals not to exceed 10 years and will continue to implement specific frequencies of five years for the spray pond inspections and settlement monitoring surveillance. The 10-year inspection interval considers the aggressiveness of the environmental conditions in that the weathering conditions at Palo Verde are "Negligible" according to ASTM C33, Fig. 1. In addition the 5-year inspection frequency for the spray ponds is consistent with the frequencies noted in ACI 349.3R-96 for continuous fluid-exposed structures and structures retaining fluid and pressure.

Palo Verde procedures require performance of a baseline inspection of structures. The baseline structure inspection determined the inspection frequency commensurate with the safety significance of the structure and its condition but not exceeding 10 years on an equivalent unit basis. Items identified during the periodic inspections that require corrective action are also inspected in the other two units. After each periodic inspection of a structure, a reassessment of the inspection frequency is required to be performed based on the results of the inspection. Again, the inspection frequency is determined commensurate with the safety significance of the structure and its condition and could result in more frequent monitoring. Palo Verde Structures Monitoring baseline and periodic inspections have not identified a structural condition that has resulted in a loss of intended function for structures within the scope of license renewal.

Enclosure 4

Supplemental Response to RAI 4.7.5-1, Pressurizer Nozzles

NRC RAI 4.7.5-1

LRA Section 4.7.5 references WCAP-15973-P, "Low Alloy Steel Component Analysis Supporting Small Diameter Alloy 600/690 Nozzle Repair/Replacement Program," and concludes, "[t]he bounding case for general corrosion in pressurizer heater sleeves in WCAP-15973-P gives an estimated repair life of 194 years; therefore the analysis is not a time-limited aging analysis (TLAA), and is valid for the period of extended operation."

The staff's evaluation of the general corrosion analysis supporting half-nozzle repairs of small-diameter Alloy 600/690 nozzles was documented in the safety evaluation (SE) dated January 12, 2005, for the WCAP-15973-P report. Please identify the plant-specific submittal addressing the general corrosion in support of the half-nozzle repairs installed in the pressurizer heater sleeves. Since the corrosion results are time dependent, unless they were evaluated and approved in an SE for a period of time covering the period of extended operation, they should be evaluated now as a TLAA. Please also provide the Updated Final Safety Analyses Report Supplement for this TLAA.

APS Supplemental Response to RAI 4.7.5-1

(This response replaces the RAI 4.7.5-1 response provided in APS letter no. 102-06140, dated March 1, 2010)

The plant-specific submittal addressing general corrosion in support of the half-nozzle repairs installed in the pressurizer heater sleeves for the three PVNGS units is Relief Request 29 which requested relief from inspection requirements of the pressurizer heater sleeve and Alloy 82/182 weld remnant at the inner clad for the three PVNGS units. It was filed by APS letter no. 102-05112, dated June 15, 2004 (ADAMS Accession No. ML041750296), clarified by RAI responses in letter no. 102-05141, dated August 24, 2004 (ADAMS Accession No. ML041750296), and approved by an NRC letter and safety evaluation dated November 5, 2004 (ADAMS Accession No. ML043130170). This approval, therefore, preceded the January 12, 2005, safety evaluation approving WCAP-15973-P, Revision 1 (ADAMS Accession No. ML050180528). For general corrosion, the APS relief request cited the results of WCAP-15793-P Revision 1, the same revision approved by the January 12, 2005, safety evaluation.

Section 3.1 (pages 6 and 7) of the January 12, 2005, safety evaluation approving WCAP-15973-P, Revision 1, specified five plant-specific calculations that licensees would need to perform in order to confirm that the ferritic portions of the vessels or piping within the scope of the WCAP topical report will be acceptable for service throughout the licensed lives of their plants. Provided below are the five plant-specific calculations specified in WCAP-15973-P, and the APS response to each. The text of the January 12, 2005, safety evaluation is provided in italics.

Licensees seeking to use the methods of the TR [the WCAP] need to perform the following plant-specific calculations in order to confirm that the ferritic portions of the vessels or piping within the scope of the TR will be acceptable for service throughout the licensed lives of their plants (40 years if the normal licensing basis plant life is used or 60 years if the facility is expected to be approved for extension of the operating license):

General Response

WCAP-15973-P-A Rev. 0 Section 4 states that the calculated bounding cases cover all CE plants (with one exception, for Palisades), that they "are very conservative," and that the bounding case for heater sleeve bore corrosion is a 194-year replacement life. The corrosion analyses of WCAP-15973-P-A Rev. 0 are therefore directly applicable to Palo Verde Units 1, 2, and 3 as bounding, plant-specific analyses. The corrosion analyses of WCAP-15973-P-A Rev. 0 are identical to those of WCAP-15973-P Rev. 1 that were applied to Relief Request 29.

1. *Calculate the minimum acceptable wall thinning thickness[1] for the ferritic vessel or piping that will adjoin to the MNSA repair or half-nozzle replacement.*

   Response to Item 1

   For CE plants, including Palo Verde, Section 2.4 of WCAP-15973-P-A, Rev. 0, calculated a maximum permissible heater bore diameter that will maintain structural integrity, and then calculated the duration to reach this maximum bore diameter given the original bore diameter and the anticipated corrosion rate. The minimum, bounding calculated allowed increase was used in the calculated design life, Items 4 and 5 below.

2. *Calculate the overall general corrosion rate for the ferritic materials based on the calculational methods in the TR using the general corrosion rates listed in the TR for normal operations, startup conditions (including hot standby conditions), and cold shutdown conditions, and the respective plant-specific times (in-percentage of total plant life) at each of the operating modes.*

   Response to Item 2

   For CE plants, including Palo Verde, Section 2.3.4 of WCAP-15973-P-A, Rev. 0 calculated a single set of corrosion rates in the pressurizer lower head heater sleeve bores that is bounding (maximum expected). The rate varies among normal operating, intermediate temperature startup, and cold shutdown conditions, of which the cold shutdown condition is the most significant contributor. The calculated rate therefore depends on the percentage of time at cold shutdown. The percentage of

[1] Understood to mean "...the *maximum* acceptable wall thinning," or "the *minimum* acceptable wall thickness...."

time at cold shutdown assumed by this calculated rate is therefore confirmed during the operating life as described in the response to Item 3 below.

3. *Track the time at cold shutdown conditions to determine whether this time exceeds the assumptions made in the analysis. If these assumptions are exceeded, the licensees shall provide a revised analysis to the NRC, and provide a discussion on whether volumetric inspection of the area is required.*

   Response to Item 3

   As stated in the APS response to RAI 4.7.4-1 in APS Letter 102-06139, dated March 1, 2010, LRA Appendix A, Table A4-1, Commitment 46 documents the APS commitment to continue to monitor the cold shutdown conditions via the current tracking method for the period of extended operation, that is, for the fifth and sixth inspection intervals.

4. *Calculate the amount of general corrosion-based thinning for the vessels or piping over the life of the plant, as based on the overall general corrosion rate calculated in Step 2 and the thickness of the ferritic vessel or piping that will adjoin to the MNSA repair or half-nozzle replacement.*

   Response to Item 4

   See Item 5.

5. *Determine whether the vessel or piping is acceptable over the remaining life of the plant by comparing the worst case remaining wall thickness to the minimum acceptable wall thickness for the vessel or pipe.*

   Response to Items 4 and 5

   For CE plants, including Palo Verde, WCAP-15973-P-A Rev. 0 Section 2.4 calculated a single, bounding (minimum expected) estimated lifetime of 194 years by dividing the minimum allowed increase in lower head heater sleeve bore diameter (Item 1 above) by the maximum expected diametral increase per year (Item 2 above).

   > *Plant-specific engineering evaluations that have been calculated in accordance with these methods and that demonstrate that the ferritic materials will not be thinned by general corrosion to a size less than the minimum allowable wall thickness for the component are sufficient to satisfy the acceptability by analysis provisions of Section XI for defects induced by general corrosion or crevice corrosion.*

   Since the period of extended operation is limited to a 60-year life, corrosion in the heater sleeve bores will therefore remain within an acceptable range, provided that

the time-at-temperature assumption of the corrosion rate calculation continues to remain valid, as confirmed by Item 3, above.

Since the corrosion analyses will not change with a change in the licensed operating period and are therefore not supported by a TLAA, no revision to the Updated Final Safety Analysis Report Supplement is required.

Enclosure 5

Supplemental Response to RAI 2.1-2, Moderate Energy Crack Evaluation

Enclosure 5
Supplemental Response to RAI 2.1-2,
Moderate Energy Crack Evaluation

NRC RAI 2.1-2

Background:

Pursuant to 10 CFR 54.4(a)(2), the applicant must consider all nonsafety-related SSCs, within the scope of license renewal, whose failure could prevent the satisfactory accomplishment of safety-related functions, as described in 10 CFR 54.4(a)(1).

Issue:

During the scoping and screening methodology audit, performed on-site October 19 – 22, 2009, the staff determined, through a review of the 10 CFR 54.4(a)(2) implementing document, that the applicant had not included certain fluid-filled, nonsafety-related SSCs, adjacent to safety-related SSCs, within the scope of license renewal. The applicant's basis for not including the nonsafety-related SSCs was information contained in the applicant's "Moderate Energy Crack Evaluation," document.

Request:

The staff requests that the applicant perform a review of the issue and provide the following:

(1) The basis for the applicant's determination that the Moderate Energy Crack Evaluation is part of the current licensing basis (CLB).

(2) A description and analysis of the pertinent information contained in the Moderate Energy Crack Evaluation which provides the basis for the conclusion that failure of the nonsafety-related, fluid filled SSCs could not prevent the satisfactory accomplishment of safety-related functions for SSCs relied on to remain functional during and following a design basis event.

(3) The nonsafety-related SSCs which were not included within the scope of license renewal on the basis of information contained in the Moderate Energy Crack Evaluation.

Indicate if the review concludes that use of the scoping methodology precluded the identification of nonsafety-related SSCs that could interact with safety-related SSCs, and which were not specifically exempted by the CLB, and therefore should have been considered within the scope of license renewal in accordance with 10 CFR 54.4(a)(2). Describe any additional scoping evaluations to be performed to address the (a)(2) criteria. As part of your response, list any additional SSCs included within the scope as a result of your efforts, and list those structures and components for which aging management reviews were conducted. For each structure and component, describe the aging management programs, as applicable, to be credited for managing the identified aging effects

APS Supplemental Response to RAI 2.1-2

(This response replaces the RAI 2.1-2 response provided in APS letter no. 102-06129, dated February 5, 2010)

Criterion (a)(2) – Moderate Energy Crack Evaluation

Request (1) response

PVNGS UFSAR Table 3.6-3 provides the methods of protection of safety-related systems from the effects of high and moderate energy line breaks. The methods specified in the table are layout, enclosure, and redundancy. The Moderate Energy Crack Evaluation was prepared to verify, in part, the protection methods specified in PVNGS UFSAR were met. Therefore, Moderate Energy Crack Evaluation, 13-MC-ZZ-642, is part of the current licensing basis (CLB) as defined in 10 CFR 54.3.

Request (2) response

Palo Verde has revised its 10 CFR 54.4(a)(2) implementing document to delete the use of information contained in the Moderate Energy Crack Evaluation. The Moderate Energy Crack Evaluation will not be used to provide the basis for determination that failure of the non-safety related fluid-filled structures, systems, and components (SSCs) could not prevent the satisfactory accomplishment of safety related functions for SSCs relied on to remain functional during and following a design basis event.

Request (3) response

The information contained in the Moderate Energy Crack Evaluation had been used to evaluate spatial interaction of nonsafety-related SSCs in the Auxiliary Building, Control Building, Diesel Generator Building, and Fuel Building. As a result of the revision to the 10 CFR 54.4(a)(2) implementing document, the nonsafety-related SSCs that were previously excluded from the scope of license renewal using information contained in the Moderate Energy Crack Evaluation and could interact with safety-related SSCs in the Auxiliary Building, Control Building, Diesel Generator Building, and Fuel Building were evaluated and included within the scope of license renewal in accordance with criterion 10 CFR 54.4(a)(2).

As a result of the re-evaluation performed, the LRA sections listed below have been revised, as shown in LRA Amendment No. 13 in Enclosure 2. This includes nonsafety-related SSCs in the Auxiliary Building, Control Building, Diesel Generator Building, and Fuel Building within the scope of license renewal in accordance with criterion 10 CFR 54.4(a)(2).

- Chemical and Volume Control:
  - Table 2.3.3-10
  - Section 3.3.2.1.10
  - Table 3.3.2-10
  - Section B2.1.10
  - Section B2.1.17

- Demineralized Water
  - Section 3.3.2.1.23
  - Table 3.3.2-23

- Radwaste Building HVAC
  - Section 3.3.2.1.16
  - Table 3.3.2-16

- Miscellaneous auxiliary systems in scope only for criterion 10CFR 54.4(a)(2) (Including Chemical Waste, Liquid Radwaste, Sanitary Sewage and Treatment, and Secondary Chemical Control)
  - Section 2.3.3.30
  - Table 2.3.3-30
  - Section 3.3.2.1.30
  - Table 3.3.1 item 76
  - Table 3.3.2-30

The Moderate Energy Crack Evaluation did not apply to the Containment, Main Steam Support Structure (MSSS), and pipe tunnels in the yard. Non-safety related liquid-filled piping segments in the Containment and MSSS Building that could interact with safety-related SSCs, were previously included within the scope of license renewal for spatial interaction. In addition, non-safety related liquid-filled piping segments in the pipe tunnels between the yard and the buildings that could interact with safety-related SSCs were also previously included within the scope of license renewal for spatial interaction.

Enclosure 6

Supplemental Response to RAI 2.3-01, Spatial Interaction Terminations for Domestic Water and Demineralized Water

Enclosure 6
Supplemental Response to RAI 2.3-01,
Spatial Interaction terminations for Domestic Water and Demineralized Water

NRC RAI 2.3-01

Background:

Portions of several systems have spatial interaction as non-safety affecting safety-related components in the fuel building and in the auxiliary building and are within the scope of license renewal as non-safety affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2).

Issue:

The following spatial interaction terminations are shown as license renewal boundaries for 10 CFR 54.4(a)(2) piping. However, the basis for the spatial interaction termination cannot be determined, e.g. entering a building/room with no safety-related components, becoming buried pipe.

Request:

Provide the bases (e.g., entering a building/room with no safety-related components, becoming buried pipe) for the spatial interaction terminations.

APS Supplemental Response to RAI 2.3-01

(This response is an addition to the RAI 2.3-01 response provided in APS letter no. 102-06122, dated January 18, 2010)

See the "APS Response" column in the tables below.

Domestic Water and Demineralized Water Spatial Interactions (SI)

DOMESTIC WATER (2.3.3.22)		
LRA drawing LR-PVNGS-DS-01-M-DSP-002		
Drawing Location	**Plant Location**	**APS Response**
Location G-4, N-432-YDGA-1" to valve V483.	Auxiliary Building Roof (ABR)	SI terminates where the pipe exits the Auxiliary Bldg to the roof.
Location G-4, N-434-YDGA-1" to valve V484.	ABR	SI terminates where the pipe exits the Auxiliary Bldg to the roof.
Location G-4, N-435-YDGA-1" to valve V486.	ABR	SI terminates where the pipe exits the Auxiliary Bldg to the roof.
Location F-7, N-436-YDGA-1" to valve V488.	ABR	SI terminates where the pipe exits the Auxiliary Bldg to the roof.
Location F-7, N-078-YDGA-1" to valve V072 and N-079-YDGA-1" to valve V076 (to Fuel Building AHUs.)		SI terminates where the pipe exits the Auxiliary Bldg to the roof.
Location D-5, N-499-HBDD-4" to the Cont Bldg Sump East. (downstream of intersection with line N-251-HBDD-4")	Basement Control Bldg	The piping is in the scope of license renewal. This drawing error has been corrected.

DEMINERALIZED WATER SYSTEM (2.3.3.23)		
LRA drawing LR-PVNGS-DW-01-M-DWP-002		
Drawing Location	**Plant Location**	**APS Response**
Location G-2, N-111-HCDA-1 1/2".	AB 77', V102	Added to scope of license renewal based on revision of (a)(2) guidance.
Location G-4, N-112-HCDA-1 1/2".	AB 100', V132	Added to scope of license renewal based on revision of (a)(2) guidance.
Location G-2, N-092-HCDA-1 1/2".	AB 70',V122 7 V013	Added to scope of license renewal based on revision of (a)(2) guidance.
Location F-4, N-115-HCDA-1".	70', Control Bldg sumps	This was already in scope. As noted, it goes to the control building sumps, not the containment.
Location F-2, N-109-HCDA-1 1/2".	AB 40', V118	Added to scope of license renewal based on revision of (a)(2) guidance.
Location F-2, N-085-HCDA-1 1/2".	AB 40', V116	This was already in scope. The adjacent line, N-086, was not, but has been added to scope of license renewal based on revision of (a)(2) guidance.
Location F-3, N-062-HCDA-2".	DG Bldg 100', V378	Added to scope of license renewal based on revision of (a)(2) guidance.
Location E-2, N-084-HCDA-1 1/2" and N-086-HCDA-1 1/2"	AB 51' (N-084) AB 40' (N-086) V093	Added to scope of license renewal based on revision of (a)(2) guidance.
Location E-3, N-113-HCDA-1 1/2".	AB 120', V139	The 113 piping enters the 120' Elevation in fire zone 52D which has no SR equipment.
Location D-4, N-058-HCDA-2".	V357, V146, V382	SI terminates at the Turbine Building. There is no safety related equipment in the Turbine Building.
Location D-2, N-087-HCDA-1 1/2".	AB 77', V094 an V101	Added to scope of license renewal based on revision of (a)(2) guidance.
Location C-4, N-059-HCDA-2".	ABR, V145	SI terminates where the pipe exits the Auxiliary Bldg to the roof.
Location C-4, N-129-HCDA-2".	MSSS Tunnel	This was already in scope.
Location C-3, N-148-HCDA-1½"	Fuel Bldg 140', V312, V064	Added to scope of license renewal based on revision of (a)(2) guidance.
Location B-2, N-050-HCDA-1 1/2" and N-50-HCDA-3".	Fuel Bldg	The 3" piping line enters the fuel building 100' elevation fire zone 27 from a buried environment in the yard. The 1 ½" piping line has been added to scope of license renewal based on revision of (a)(2) guidance.