A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear Generating Station

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102-06297-JHH/GAM
December 16, 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
Correction to License Renewal Application Section B2.1.10, Closed-Cycle Cooling Water System

By letter no. 102-06134, dated February 19, 2010, Arizona Public Service Company (APS) submitted Amendment No. 9 to the PVNGS license renewal application (LRA). It was recently discovered that an exception to NUREG-1801 was inadvertently deleted from LRA Section B2.1.10, Closed-Cycle Cooling Water System, and two enhancements were inadvertently included. Since the deletion and inclusions were inadvertent, they were not identified as changes in Amendment No. 9.

This discrepancy has been entered into the Palo Verde corrective action program as Palo Verde Action Request (PVAR) no. 3567465. A review to determine the extent of condition is being performed, and this review has found no additional discrepancies at this time.

APS reviewed Section 3.0.3.2.5, Closed-Cycle Cooling Water System, of the NRC's *Safety Evaluation Report with Open Items related to the License Renewal of PVNGS Units 1, 2, and 3*, issued on August 6, 2010, to determine any impact of the LRA Section B2.1.10 discrepancy introduced in LRA Amendment No. 9. This review found that Section 3.0.3.2.5 of the SER with Open Items had correctly addressed the LRA Section B2.1.10 exceptions and enhancements as described in APS's original LRA submittal in letter no. 102-05937, dated December 11, 2008, and was, therefore, not impacted by the Section B2.1.10 discrepancy introduced in LRA Amendment No. 9.

Enclosed is a corrected version of LRA Section B2.1.10. This corrected LRA Section B2.1.10 restores the inadvertently deleted exception to NUREG-1801 (identified with a revision bar), and reflects the previously completed enhancements as shown in LRA Amendment No. 26 submitted in letter no. 102-06279, dated November 10, 2010.

A138
NRR

Should you need further information regarding this submittal, please contact Glenn Michael, Licensing Engineer for License Renewal, at (623) 393-5750.

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

Executed on 12/16/10
(date)

Sincerely,

JHH/RAS/GAM/gat

Enclosure: Corrected License Renewal Application Section B2.1.10, Closed-Cycle Cooling Water System

cc:

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

ENCLOSURE

Corrected License Renewal Application
Section B2.1.10, Closed-Cycle Cooling Water System

LRA Section	Page No.
B2.1.10	B-34, 35, 36, 37, 38

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 is 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.

Preventative Actions – Element 2, Parameters Monitored or Inspected - Element 3, Detection of Aging Effects – Element 4, Monitoring and Trending – Element 5 and Acceptance Criteria – Element 6.

The program described in NUREG-1801, Section XI.M21, is based on the 1997 version of the EPRI Closed Cooling Water Chemistry Guidelines, TR-107396 Rev. 0. The PVNGS program currently uses the 2004 version of the EPRI Closed Cooling Water Chemistry Guidelines Rev. 1. This difference is considered to be an exception. This exception is acceptable because the EPRI Closed Cooling Water Chemistry guidelines are a consensus document that is updated based on new operating experience, research data, and expert opinion. Incorporation of later versions of the guidance document ensures that the program addresses new information.

Enhancements

None

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 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.