Arizona Public Service
PALO VERDE NUCLEAR GENERATING STATION
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WILLIAM L. STEWART
EXECUTIVE VICE PRESIDENT
NUCLEAR

102-03576-WLS/AKK/DLK
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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Washington, DC 20555-0001

Reference: 1) Letter 102-02626 dated September 3, 1993, from W. F. Conway, APS, to USNRC

2) Letter 102-02678 dated October 1, 1993, from W. F. Conway, APS, to USNRC

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528, 50-529, 50-530
License Nos. NPF-41, NPF-51, NPF-74
Revised Response to Notice of Deviation 50-528/529/530/93-17-02

Arizona Public Service Company (APS) is revising the original response to Notice of Deviation (NOD) 50-528/529/530/93-17-02, dated July 21, 1993. The NOD cited several examples where APS deviated from the commitments made to the NRC in response to Generic Letter 89-13, "Service Water System Problems Affecting Safety Related Equipment." The date of full compliance provided in reference 1, "Reply to Notice of Deviation 50-528/529/530/93-17-02" was not achieved as written.

The date of full compliance provided in the original response was based on accelerating the initial heat exchanger test program. A test method was developed to facilitate on-line heat exchanger testing using the Spent Fuel Pool as a heat source. APS planned to test the Essential Cooling Water (EW) heat exchangers on six month intervals as opposed to the traditional eighteen month intervals in order to complete the initial test program in eighteen months verses fifty-four months. As a result of the development of a more accurate thermal performance test, the accelerated initial heat exchanger test program was abandoned and the EW heat exchangers were tested off-line during refueling outages. This change was not evaluated against the original due date and led to a delayed completion. While the method and frequency of heat exchanger thermal

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performance testing currently being used is consistent with APS' revised response to GL 89-13 (reference 2), the date of full compliance provided in reference 1, September 30, 1995, was not achieved as written. This delay had no effect on the ability of the Spray Pond (SP) System or EW System to perform their intended safety functions.

The first set of initial thermal performance tests have been completed on both EW heat exchangers in Units 1, 2, and 3. The test results were satisfactory and confirmed that the EW heat exchangers are performing as designed with ample margin. Based on the test results, APS considers that full compliance with GL 89-13 was achieved on November 2, 1995 when testing was successfully completed on both EW heat exchangers in all three units. Heat exchanger thermal performance testing will continue to be performed in accordance with the commitments made in reference 2, "Revised Response to NRC Generic Letter 89-13."

Enclosure 1 to this letter is a restatement of NOD 50-528/529/530/93-17-02. APS' revised response is provided in Enclosure 2. A revision bar in the left margin is included to indicate the revision. Enclosure 3 contains the basis for the current method and frequency of heat exchanger thermal performance testing.

Should you have any questions, please contact Angela K. Krainik (602) 393-5421.

Sincerely

JA Bailey for WLS

WLS/AKK/DLK/dpr

Enclosures:

1. Restatement of Notice of Deviation
2. Reply to Notice of Deviation
3. Basis for Heat Exchanger Thermal Performance Testing

cc: L. J. Callan (all with enclosures)
K. E. Perkins
K. E. Johnston
B. E. Holian

ENCLOSURE 1

RESTATEMENT OF NOTICE OF DEVIATION 50-528/529/530/93-17-02

NRC INSPECTION CONDUCTED JUNE 7 THROUGH JUNE 25, 1993

INSPECTION REPORT NO. 50-528/529/530/93-17

Restatement of Notice of Deviation 50-528/529/530/93-17-02

During an NRC inspection conducted from June 7 to June 25, 1993 a deviation of your commitments made in response to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Action" 10 CFR Part 2, Appendix C, the deviation is listed below:

> In response to Generic Letter 89-13, Arizona Public Service Company letters 161-02801-JNB/JST and 161-04031-WFC/JRP dated January 26, 1990 and July 1, 1991 respectively stated in part that:
>
> "Testing to demonstrate thermal performance and heat transfer capability of both open and closed cycle will be performed..."
>
> "Existing preventative maintenance tasks regularly inspect the components identified in the Generic Letter." The Generic Letter identified "...service water system piping..." as components applicable to the Generic Letter concern.
>
> Contrary to the above, the NRC inspection identified that as of June 25, 1993, testing which demonstrated thermal performance and heat exchanger capability had not been performed, and the inspection of service water piping had not been included in the regular preventative maintenance tasks.

ENCLOSURE 2

REPLY TO NOTICE OF DEVIATION 50-528/529/530/93-17-02

NRC INSPECTION CONDUCTED JUNE 7 THROUGH JUNE 25, 1993

INSPECTION REPORT NO. 50-528/529/530/93-17

Reply to Notice of Deviation 50-528/529/530/93-17-02

Reason for the Deviation:

Arizona Public Service Company's (APS) response to NRC Generic Letter (GL) 89-13 contained both an omission and an unnecessary commitment that went unrecognized and uncorrected during the GL response development and review cycle. Specifically, the response omitted a plan to develop a periodic inspection program for service water system piping and committed to conduct thermal performance testing on closed-cycle service water system heat exchangers and small, accessible open-cycle service water system heat exchangers. The response was based on recommendations from engineering that were not adequately reviewed against the recommendations provided in the GL.

GL 89-13 also required confirmation to the NRC that all the recommended actions (of the GL) or their justified alternatives had been implemented. The verification performed at Palo Verde did not identify any concerns with APS' GL 89-13 program or commitment implementation. The verification only confirmed that the procedures to implement the program existed. The verification did not evaluate the adequacy of the program to meet the recommendations of the GL, nor did the verification confirm that procedures were being performed as committed.

Finally, the management controls placed on the "ongoing" testing to demonstrate heat exchanger thermal performance and heat transfer capability, were ineffective in ensuring that the testing was scheduled and performed as committed. Heat exchanger thermal performance testing was not incorporated into a system that automatically placed it into the refueling outage schedules and, as such, was not performed on all heat exchangers as committed.

Corrective Actions Taken and Results Achieved:

APS completed an in-depth self assessment of the service water systems, including an evaluation of the original commitments made in response to GL 89-13. As a result, APS is currently revising the original GL 89-13 response. The revised response will include a plan to develop maintenance tasks that periodically inspect service water system piping. Additionally, the original commitment to conduct thermal performance testing on all open and closed-cycle service water system heat exchangers will be revised taking into consideration EPRI guidelines as discussed in the next section.

An operability review was performed on all open and closed-cycle service water system heat exchangers under Condition Report/Disposition Request 930532. Based on the satisfactory performance of the heat exchangers during Integrated Safeguards Testing, Performance Engineering system temperature trend results, high quality system chemistry

control, and the results of visual heat exchanger inspections conducted during refueling outages, engineering determined that all open and closed-cycle heat exchangers are capable of performing their intended safety function and are therefore capable of meeting their design basis requirements.

Nuclear Engineering is reconstituting the design basis calculations for the service water systems. The results of these calculations will be used to determine the type of heat exchanger testing to be performed and the accuracy of instrumentation needed to adequately verify that design heat transfer rates will be met.

The manager of Quality Audits and Monitoring (QA&M) has conducted a discussion with the QA&M staff to reinforce management expectations with regards to audit and monitoring activities. These expectations include the need to clearly describe the scope of Quality Assurance overview activities in audit and monitoring reports in order to provide plant management with accurate indicators of plant performance.

Corrective Action That Will Be Taken To Avoid Further Deviations:

The heat exchanger thermal performance program will be revised taking into consideration EPRI guideline NP-7552 (Heat Exchanger Performance Monitoring) dated December 1991. This guideline, developed in response to GL 89-13, provides methods test heat

exchangers using steady state heat loads, thus potentially eliminating the need for a refueling outage to determine the heat transfer capabilities of safety-related heat exchangers.

Video camera inspections on a portion of the spray pond piping in Units 1 and 3 will be conducted during refueling outages 1R4 and 3R4, respectively. Engineering will evaluate the inspection results from all three units (Unit 2 has already been inspected and evaluated as satisfactory) and recommend the scope and frequency of spray pond system piping inspections to be included in the preventive maintenance program by June 30, 1994.

Quality Assurance management will ensure that future oversight activities involving technical issues are assigned to technically qualified individuals.

Date When Full Compliance Will Be Achieved:

APS implemented the revised EW heat exchanger thermal performance and heat exchanger capability testing program in March, 1994. Full compliance was achieved on November 2, 1995, when testing was successfully completed on both EW heat exchangers in all three units.

ENCLOSURE 3

Basis for Heat Exchanger Thermal Performance Testing

Basis for Heat Exchanger Thermal Performance Testing

The Essential Cooling Water (EW) heat exchanger testing procedure was developed in accordance with the commitments made in the revised response to NRC Generic Letter (GL) 89-13 (reference 2). The intent of the thermal performance testing program was to perform three tests on each EW heat exchanger, which would satisfy the requirement to complete an initial test program. Each EW heat exchanger is currently being tested every refueling outage in accordance with Palo Verde's Service Water Reliability Program and will continue to be tested every refueling outage until at least three tests have been performed on each EW heat exchanger. Once this initial test program is complete, a periodic retest program will be established based on one of the five methods described in EPRI NP 7552 guidelines with a retest interval of less than five years.

The accelerated testing program discussed in APS' initial response to NOD 50-528/529/530/93-17-02 would have required mid-cycle testing at approximately six month intervals. This testing approach presented a number of disadvantages, three of which are listed below:

Testing during mid-cycle operation provides only the spent fuel pool decay heat for a heat load on the EW heat exchangers. The very low spent fuel pool heat loads produce very small temperature differences across an EW heat exchanger. Extremely accurate temperature measurements are necessary to obtain thermal performance data with acceptable accuracy. Such testing would prove to be difficult and impractical. The current thermal performance testing, performed during refueling outages, uses the additional load of the core decay heat to provide larger temperature differences across the EW heat exchangers. The data obtained under these test conditions is more reliable.

Testing on six month intervals presents difficulties in achieving meaningful thermal performance trend data because no significant degradation occurs over six months. The SP system used at Palo Verde is an "open" cooling water system but differs considerably from the "open" service water systems at plants that use raw (untreated) water for once-through service water cooling. Spray Pond water chemistry is closely monitored and controlled to minimize corrosion of heat exchanger materials and to control potential biological growths and potential scaling. As a result, the EW heat exchangers are not subject to the failure mechanisms common to raw water service water systems, such as biological tubesheet blockage, tube fouling or silt buildup. Due to the controlled system conditions, no significant degradation occurs over the shorter six month testing intervals.

Testing during mid-cycle operation requires a train of the EW system to be removed from service and considered INOPERABLE for the duration of the

testing evolution. This test condition contributes to system unavailability and negatively impacts the Maintenance Rule targets established for the EW system.

The intent to test each EW heat exchanger during every refueling outage for a minimum of three performances is consistent with the GL 89-13 Recommended Action II. Based on current outage schedules, three consecutive thermal performance tests will be completed on all the EW heat exchangers at the completion of refueling outage 3R7 (1998).