APS

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Palo Verde Nuclear
Generating Station

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102-05421-CE/SAB/GAM
February 23, 2006

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

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 2
Docket No. STN 50-529
Supplement to Emergency Amendment to Technical Specifications 3.7.8, "Essential Spray Pond System (ESPS)" and 3.8.1, "AC Sources – Operating"

In letter no. 102-05420, dated February 23, 2006, APS requested an emergency Technical Specification (TS) amendment that would allow a one-time extension of the 72-hour allowed outage times (AOTs) of TS 3.7.8, Essential Spray Pond System (ESPS), Required Action A.1, and TS 3.8.1, AC Sources – Operating, Required Action B.4, which were entered at 0302 hours on February 21, 2006, by an additional 4 days (96 hours) to complete repairs on underground ESPS train B piping.

Subsequent to submitting the TS amendment request, APS has completed excavation and examination of the ESPS train B supply and discharge piping areas suspected to be leaking and concluded that the ESPS train B piping is not leaking, and is intact and functional. Further discussion of this conclusion is provided below. APS plans to restore the soil covering the ESPS pipes, and restore the system to operable status. However, it is anticipated that the restoration of the soil to provide the seismic capability of the ESPS pipes may take longer than the time remaining before expiration of the current 72 hour AOT, and therefore NRC approval of the AOT extension in order to complete restoration of the ESPS to operable is still requested.

The required affidavit is provided in Enclosure 1. Responses to NRC verbal requests for additional information (RAI) are provided in Enclosure 2. A revised probabilistic risk analysis (PRA) discussion to reflect the functionality of the ESPS is provided in Enclosure 3.

Conclusion That the ESPS Train B is Intact and Functional

APS has completed excavation and examination of the ESPS train B supply and discharge piping areas suspected to be leaking. The exposed ESPS pipes showed no evidence of leakage, both with and without normal flow in the system. The protective wraps around the pipes were in good condition; any pipe leakage would be expected to cause a degradation of the wrap in the leakage area.

Water, seeping from the earth walls of the trenches, was observed to be collecting in the bottom of the trenches under the exposed ESPS supply and return pipes. Chemical analysis of samples of the water from the trenches showed no zinc; the presence of zinc would be expected if the water was from the ESPS. The history of excavation around the PVNGS site shows that it is not uncommon to observe groundwater in the embedment of buried pipe excavations, even after long periods without rain.

In the February 23, 2006 amendment request, APS provided the following reasons for concluding that the ESPS train B piping was leaking and thus declaring ESPS train B inoperable at 0302 hours on February 21, 2006:

> "Leakage was identified dripping from around the ESPS pipe where it entered an underground pipe chase. The leakage was confirmed to be from the buried ESPS pipe because (1) the dripping increased when the ESPS pump was started and pressurized the line, and (2) the chemistry of the leaking water was similar to that of the ESPS."

After excavating the pipe, observing no pipe leakage, and sampling the water accumulating in the trenches, this conclusion has changed. The increase in dripping observed from around the ESPS supply pipe penetration into the pipe chase when the ESPS pump was started is now concluded to have been the result of groundwater migrating from the soil due to the normal vibration of the line during system operation. Due to the drop in the buried pipe elevation, the migration of groundwater would be expected to follow the structure to the area where the water was observed at the pipe chase penetration. With regard to the chemistry of the sampled water, the earlier conclusion that it was ESPS leakage was based on finding zinc in the sample of drippage on the pipe chase floor. However, since that pipe chase area has previously had spray pond water in it from inadvertent spillage while draining the spray pond during outages, it is likely that the zinc in the sample was residual from previous spray pond draining.

No commitments are being made in this letter. If you have any questions, please contact Thomas N. Weber at (623) 393-5764.

Sincerely

CE/SAB/GAM

Enclosures:
1. Affidavit
2. APS' Response to Request for Additional Information
3. Revised Probablistic Risk Analysis Discussion

cc:	B. S. Mallett	NRC Region IV Regional Administrator
	M. B. Fields	NRC NRR Project Manager
	G. G. Warnick	NRC Senior Resident Inspector for PVNGS
	A. V. Godwin	Arizona Radiation Regulatory Agency (ARRA)

ENCLOSURE 1

AFFIDAVIT

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, Clifford Eubanks, represent that I am Vice President Nuclear Operations, Arizona Public Service Company (APS), that the foregoing document has been signed by me on behalf of APS with full authority to do so, and that to the best of my knowledge and belief, the statements made therein are true and correct.

Clifford Eubanks

Sworn To Before Me This 23rd Day Of February, 2006.

Rosemarie Majors
Notary Public

"OFFICIAL SEAL"
Rosemarie Majors
Notary Public-Arizona
Maricopa County
My Commission Expires 5/24/2007

Notary Commission Stamp

Enclosure 2
Arizona Public Service Company's
Response to request for additional Information

NRC Request

Provide information on spray pond piping corrosion and basis for assumptions of pitting verses general corrosion.

APS Response

The heat exchangers and piping in the spray pond (SP) system are constructed of carbon steel with an interior epoxy coating which provides corrosion protection. Corrosion protection is also provided by the addition of zinc to the spray pond water. A zinc inhibitor addition was started in 1995. Zinc addition is not effective in protecting already existing pits, but it is effective in inhibiting general corrosion.

At PVNGS, the Essential Spray Pond System Corrosion Monitoring procedure is used to monitor spray pond piping corrosion. Corrosion rates are determined by monitoring carbon steel coupons which are exposed to spray pond water and are withdrawn and tested yearly. Based on the samples from last five years, the observed corrosion rate for the Unit 2 spray pond coupons is between 0.1 and 0.2 mil per year. Additionally, a buried pipe spool piece was removed from Unit 1 service in the fall of 1999. Inspection of this spool piece showed that the carbon steel spray pond piping does not exhibit a general corrosion problem. However, some isolated pitting has been observed when there is localized coating failure.

Also, no stress corrosion or any other cracking problems have been encountered in spray pond piping.

Summary of SP Piping Monitoring and Historical System Leaks:

All the through-wall defects identified in these SP components, as delineated below, have been characterized as "pin-hole" leaks. All these through-wall "pin-hole" leaks have been attributed to localized pitting corrosion, initiated by defects in the epoxy coating. Structural assessments have indicated that the structural integrity of individual components are not challenged by this corrosion mechanism.

Routine Monitoring of SP Piping:

SP system return line piping pressure is monitored upstream of the discharge nozzles where the return piping enters at the pond wall under Procedure 40DP-9OP06, Appendices SP001 and SP002. This pressure monitoring is performed on a monthly basis for both trains of SP (procedure 70DP-9SP01, section 3.3.2). The minimum

acceptable pressure reading is 7.0 psig and the typical reading is 8 – 9 psig. The purpose of this monitoring is to detect any significant leakage in the SP system. No significant leakage has been detected.

Visual monitoring via remote camera is performed on approximately 50 feet of the ESPS outlet return piping from the essential cooling water (EW) heat exchangers inside the heat exchanger room. The inlet supply elbow to the EW heat exchanger is also inspected with the remote camera. This monitoring is performed on a refueling cycle basis on both SP 'A' and 'B' trains per the Preventive Maintenance Basis and associated tasks. No safety significant degradation has been identified. In addition, portions of the Unit 1, 2, and 3 SP system piping were inspected via remote camera in the late 1980's and early 1990's pursuant to NRC Generic Letter 89-13.

Historical Leaks on SP Piping:

- In July 1994 the Unit 1 SP 'B' train return line (2PSPBL025) developed a pinhole leak on a 24" pipe spool - weld repaired. DFWO 00667001
- In October 1998 the Unit 1 SP 'B' train cooling line to the 'B' emergency diesel generator (EDG) (2PSPBL107) developed a pinhole leak on PSV line - weld repaired during refuel outage. CMWO 1147156

Historical Leaks on SP System Components:

- In April 1988 the Unit 2 EW 'A' heat exchanger (2-EWA-E01) developed a pinhole leak on PSV line (N8). The nozzle was replaced. EER 88-EW-007, 88-EW-008, 87-SP-037, W/O 00290450
- In May 1990 the Unit 1 EW 'A' heat exchanger (1-EWA-E01) developed a pinhole leak on drain line (N7) - weld repaired. MNCR 90-EW-0008 (root cause EER 90-SP-028)
- In August 1990 the Unit 1 EW 'A' heat exchanger (1-EWA-E01) developed a pinhole leak on PSV line (N8) - soft patch / weld repaired at outage. MNCR 90-EW-0010 (no root cause)
- In May 1991 the Unit 1 EW 'A' heat exchanger (1-EWA-E01) developed a pinhole leak on drain line (N6) - soft patch / replaced at outage. MNCR 91-SP-1011 (root cause EER 90-SP-028)
- In September 1991 the 1 EW 'A' heat exchanger (1-EWA-E01) developed a pinhole leak on instrument line (N12) - weld repaired. MNCR 91-EW-1014
- In December 1992 the Unit 2 EW 'A' heat exchanger (2-EWA-E01) developed a pinhole leak on instrument line (N9) - weld repaired. MNCR 92-SP-2016 W/O 00585743

- In November 1994 a Unit 2 'B' EDG cooling line expansion joint (2MDGBY18) developed a thru-wall crack in the metal bellows of expansion joint - Expansion joint replaced. DFWO 00685250 (ERCFA CRDR 2-4-0434) (Note: the expansion joint is an uncoated thin-wall alloy metal bellows, not associated with buried piping.)

- In October 1995 the Unit 2 EW 'B' heat exchanger (2-EWB-E01) developed a pinhole leak on PSV line (N8) - weld repaired. DFWO 00728181 (ERCFA CRDR 2-5-0295)

- In October 1998 the Unit 1 SP 'B' train cooling line to the 'B' EDG (2PSPBL107) developed a pinhole leak on PSV line - weld repaired during refuel outage. CMWO 1147156

- In January 2003 the SP side of the DG "B" Lube Oil Cooler, 1MDGBE04, developed a through-wall pinhole leak on the top vent plug of the North end bell - weld repaired in a 72 hour LCO under CMWO 2577145. (CRDR 2577160)

Historical SP System Component Replacements Based on UT Examinations:

- In March 1992 the Unit 1 EW 'A' heat exchanger (1-EWA-E01) had the nozzles N6, N7, N8, N10, N11, N12 replaced (based on UT inspections). MNCR 92-EW-1001 W/O 00543128

- In April 1992 the Unit 1 EW 'B' heat exchanger (1-EWB-E01) had the nozzles N6, N8, N9, N10 replaced (based on UT inspections). MNCR 92-EW-1005 W/O 00547144

NRC Request

With the excavation as currently configured for the U2 "B" Train SP piping, will a seismic event create any operability issues for the U2 "A" train piping?

APS Response

The soil above the A train piping has not been excavated. It is approximately 3 feet from the wall of the excavated B train trench to the A train supply piping. For a seismic event to cause an A train operability problem, all of the soil above the A train piping would have to fail, or in this case, be moved into the existing open B train trench. This is not a credible event due to the following:

- The soil in the vicinity of this excavation is cohesive. T he vertical side walls of the trench did not collapse during the digging process. The soil above the "A" train piping is engineered backfill installed to structural class I backfill requirements of 95% compaction.

- The north and south walls of the "B" train trench are braced with shoring to provide lateral earth pressure to the side walls. The purpose of the shoring is to prevent structural failure of the soil. The engineered shoring though not seismically qualified is designed with a safety margin which should prevent complete structural collapse during a seismic event.

- In the unlikely event that the shoring would fail, the expected failure mode is that it would kick in from the bottom. In this event, the bottom of the shoring could only move approximately 1 foot before it would come in contact with either the "B" train supply or return line. At this point it would stop. This would not be enough movement for the soil to fail above the "A" train spray pond piping.

Enclosure 3
Revised Probabilistic Risk Analysis Discussion

1.0 Probabilistic Risk Assessment of the Proposed Essential Spray Pond/Diesel Generator AOT Extension

The risk analysis presented herein generally conforms to the three-tiered approach that is identified in Regulatory Guide 1.177, *An Approach for Plant-Specific, Risk-Informed Decision-making: Technical Specifications*, August 1998.

The Palo Verde At-Power PRA model as documented in Engineering Study 13-NS-C029 Rev 14 was used. The Risk Spectrum Professional version 2.10.02 software package from Relcon, AB of Sweden was used. Truncation values were 1E-11 for CDF and 9E-12 for LERF. Palo Verde also uses EOOS for plant risk management. This was **not** used for this analysis.

1.1 The following risk metrics are used for this analysis:

- CDF – Core Damage Frequency
- LERF – Large Early Release Frequency
- ICCDP – Incremental Conditional Core Damage Probability = [(conditional CDF with the subject equipment out of service) – (baseline CDF with nominal expected equipment unavailability)] * (duration of a single AOT under consideration).
- ICLERP - Incremental Conditional Large Early Release Probability = [(conditional LERF with the subject equipment out of service) – (baseline LERF with nominal expected equipment unavailability)] * (duration of a single AOT under consideration).

1.2 Results for Incremental Conditional CDP and LERP

The Regulatory Guides (RGs) provide guidelines for maximum increases for both incremental conditional risk (RG 1.177) and for average risk increase (RG 1.174):

- ICCDP: 5E-7
- ICLERP: 5E-8
- CDF: 1E-6/yr
- LERF: 1E-7/yr

Since Palo Verde does not have a seismic PRA model, use of the internal events model is necessary to approximate the change in risk. Palo Verde used the EPRI Seismic Margins Analysis to satisfy the requirements of Generic Letter 88-20 Supplement 4, *Individual Plant Examination for External Events*. The Review Level Earthquake (RLE) was 0.3g. For purposes of risk analysis, the RLE may be used in place of the Design Basis Earthquake (DBE) acceleration of 0.25g.

There are two considerations when evaluating risk from a seismic event. First, the continued availability of non-seismically qualified structures, systems and components (SSCs) for any level earthquake exceeding the Operating Basis Earthquake (OBE) of 0.1g is indeterminate. Thus, when performing risk calculations associated with a seismic event, no balance-of-plant (BOP) mitigating equipment should be considered available for earthquakes that exceed 0.1g acceleration. This includes off-site power and the Alternate AC Gas Turbine Generators. Second, the continued availability of qualified SSCs is also indeterminate for earthquakes that exceed the RLE; those earthquakes less than the RLE are assumed to have no impact on SSCs that are seismically qualified.

In light of the modeling considerations stated above, an increase in seismic risk can be estimated using the Loss of Off-Site Power (LOSP) event tree. This tree is used, since it already includes the effects of losing off-site power. The frequency of earthquakes in the range of interest (from the RLE down to the OBE) is substituted for the LOSP frequency. The event tree then becomes a seismic event tree rather than a LOSP tree. In addition, other equipment that would not be available following an earthquake not already disabled by the unavailability of off-site power must also be disabled by the boundary conditions applied. It must also be assumed that off-site power cannot be recovered, since there is no basis for an estimation of when it would become available. All other seismic risk would be the same as exists during normal plant configuration, and so does not contribute to a change in risk. The solution of this new seismic event tree represents R1 in the ICCDP and ICLERP calculations. R0 has a value of zero, since the solution already represents the change.

To bound the analysis, the seismic exceedance frequency difference between the RLE and OBE is used. These frequencies are obtained from the Seismic Hazard Evaluation Report for PVNGS Site, Rev. 2, Table 6-1, Risk Engineering, Inc., April 1993.

The exceedance frequency for 0.1g = 2.9E-4/yr (mean)

The exceedance frequency for 0.3 g = 2.8E-5/yr (mean)

Thus the difference is 2.62E-4/yr.

This value is substituted for the parameter IELOOP.

To estimate uncertainty, the 85th percentile exceedance values from the Seismic Hazard Evaluation Report for PVNGS Site, Rev. 2, Table 6-1, Risk Engineering, Inc., April 1993, may be used:

The exceedance frequency for 0.1g = 5.0E-4/yr (85th percentile)

The exceedance frequency for 0.3g = 5.0E-5/yr (85th percentile)

The difference is 4.50E-4/yr

The results may be ratioed proportionally to frequency to determine the upper bound on risk.

Analysis results are reported in Table 1. The quantification results represent a delta, so R0 is equal to zero. Table 1 shows the calculated CDF and LERF and subsequent incremental conditional probabilities.

Table A1: Risk Metric Calculations					
CDF R1	1.387E-5/yr	Mean ICCDP	1.52E-7	Upper bound ICCDP	2.61E-7
LERF R1	7.624E-7/yr	Mean ICLERP	8.36E-9	Upper Bound ICLERP	1.44E-8

The CDF and LERF values reported above represent the instantaneous risk for the period of seismic exposure, which will not exceed 96 hours. When averaged out over a year's time, the change in annual CDF would be less than the guideline value of 1E-6/yr and the change in annual LERF would be less than the guideline value of 1E-7/yr.

1.3 Risk Results Conclusion

The results of this analysis show that the Allowed Outage Time for the Spray Ponds/Diesel Generators may be extended by an additional four days. The calculated increase in risk can be characterized as "small" as defined in Regulatory Guides 1.174 and 1.177. Even using the 85% upper bound on seismic frequency, ICCDP and ICLERP meet the guideline values.

External events considered include internal fires and floods. Since the equipment is considered to remain available, there is no change to CDF or LERF from any external events other than the seismic event specifically analyzed here. A seismic event is considered to be independent of any other initiating event.

1.4 Deterministic Assessment of ESPS Train B Functionality

The alignment of Unit 2 Spray Pond "B" is still in the standby mode. No changes have been made to the configuration and the line-up. The Spray Pond "B" pump breaker is racked in and the auto-actuation is in service.

Engineering looked at the pipe stress levels with the system operational loads (not including seismic loads) and they were acceptable with the pipe unearthed.

The system has remained full of water and inspection of the pipe has not identified any leakage.

The system has been operated several times as part of the troubleshooting effort. No problems were noted with the system performance. During the operation of the system, there were no problems or unusual conditions noted with the unearthed piping.

The only change in status of the Unit 2 spray pond piping from the operable condition is the unearthed piping. The uncovered pipe does not change the functionality of the system as stated above.