



*A subsidiary of Pinnacle West Capital Corporation*

**10 CFR 50.73**

Palo Verde Nuclear  
Generating Station

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102-05533-CE/SAB/JAP/DFH  
July 25, 2006

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

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Unit 1  
Docket No. STN 50-528  
License No. NPF 41  
Licensee Event Report 2006-003-00**

Attached please find Licensee Event Report (LER) 50-528/2006-003-00 prepared and submitted pursuant to 10 CFR 50.73. The LER reports an actuation of the A train emergency diesel generator due to a loss of power to one class bus ('A' train - 4.16KV).

In accordance with 10 CFR 50.4, copies of this LER are being forwarded to the NRC Regional Office, NRC Region IV and the Senior Resident Inspector. If you have questions regarding this submittal, please contact James A. Proctor, Section Leader, Regulatory Affairs, at (623) 393-5730.

The corrective actions described in this LER are not necessary to maintain compliance with regulations. Arizona Public Service Company makes no commitments in this letter.

Sincerely,

CE/SAB/JAP/DFH/gt

Attachment

cc:	B. S. Mallett	NRC Region IV Regional Administrator
	M. B. Fields	NRC NRR Project Manager - (send electronic and paper)
	G. G. Warnick	NRC Senior Resident Inspector for PVNGS

IE22

## LICENSEE EVENT REPORT (LER)

(See reverse for required number of  
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects@nrc.gov](mailto:infocollects@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME Palo Verde Nuclear Generating Station Unit 1	2. DOCKET NUMBER 05000528	3. PAGE 1 OF 5
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4. TITLE Emergency Diesel Generator Actuation on Loss of Power to A Train 4.16KV Bus
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5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
05	30	2006	2006	- 003 -	00	07	25	2006	None	05000
									FACILITY NAME	DOCKET NUMBER
									None	05000

9. OPERATING MODE  Defueled	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)											
10. POWER LEVEL  N/A	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)								
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)								
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)								
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)								
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)								
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)								
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)								
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER									
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A									

## 12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME James A. Proctor, Section Leader, Regulatory Affairs - Compliance	TELEPHONE NUMBER (Include Area Code) (623) 393-5730
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## 13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

## 14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO15. EXPECTED  
SUBMISSION  
DATE

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 30, 2006, at approximately 08:13 Mountain Standard Time (MST) Unit 1 was defueled, when a loss of power (LOP) to the 'A' train class 4.16 kilo-volt (KV) bus (PBAS03) occurred. At the time of the LOP, Emergency Diesel Generator (EDG) 'A' had been manually removed from the PBAS03 bus following a maintenance surveillance test. The PBAS03 bus was powered from its normal offsite power source when an invalid load shed signal was received from the 'A' train load sequencer which caused the normal offsite power supply breaker to open and strip all loads off the bus. A valid LOP signal was received and EDG 'A' received a valid emergency run signal. EDG 'A' returned to rated frequency and voltage; however, its output breaker did not close due to the 'A' train load sequencer which had stalled, thus, preventing the needed closure signal to the EDG 'A' output breaker. PBAS03 was eventually energized from its normal offsite power supply.

The investigation identified electrical noise sensed in the load sequencer as the most likely cause of the event. Corrective actions included the installation of a modification and refurbishing the load sequencer cabinet which reduced the electrical interference.

In the past three years, there were no similar events reported for a LOP to a safety bus caused from a load sequencer problem.

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		2006 --	003 --	00	

## 17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

Note: All times listed in this event report are approximate and Mountain Standard Time (MST) unless otherwise indicated.

## 1. REPORTING REQUIREMENT(S):

Arizona Public Service (APS) submits LER (50-528/2006-003-00) pursuant to 10 CFR 50.73(a)(2)(iv)(A), to report an actuation of the 'A' train emergency diesel generator in response to a valid loss of power event to one class bus (EPBAS03). Notification of this event was made to the NRC on ENS 42609.

## 2. DESCRIPTION OF STRUCTURE(S), SYSTEM(S) AND COMPONENT(S):

Class 1E AC System

Safety-related equipment is divided into two load groups. Either one of the associated load groups is capable of providing power for safely shutting down the unit. Each alternating current (AC) load group consists of one 4.16 kilo-volt (KV) bus (EIS: EB), three 480V load centers (EIS: ED), four 480V motor control centers (MCCs)(EIS: ED), and two non-Class 1E MCCs (EIS: ED). The preferred power source for each load group is off-site ac power (EIS: EK).

Standby Power Supply (EIS Code: EK)

The standby power supply for each safety-related load group consists of one emergency diesel generator (EDG)(EIS: EK), complete with its accessories and fuel storage and transfer systems. The standby power supply functions as a source of AC power for safe plant shutdown in the event of loss of preferred power and for post-accident operation of engineered safety feature (ESF) loads.

Balance of Plant Engineered Safety Feature Actuation System (BOP-ESFAS)

The balance of plant engineered safety features actuation system (BOP-ESFAS) provides initiating signals to components requiring automatic actuation. These actuating signals are generated whenever monitored variables reach levels that require protective action.

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The following are actuation signals of the BOP-ESFAS:

- Fuel building essential ventilation actuation signal (FBEVAS)
- Containment purge isolation actuation signal (CPIAS)
- Control room ventilation isolation actuation signal (CRVIAS)
- Control room essential filtration actuation signal (CREFAS).
- Loss of power/load shed (LOP/LS)
- Diesel generator start signal (DGSS)
- Sequencer output signals

The system performs its function by initiating ESF systems equipment if selected abnormal conditions are detected. The setpoints for the actuation signals are selected to minimize the consequences of design basis accidents.

## 3. INITIAL PLANT CONDITIONS:

Unit 1 was defueled for a mid-cycle outage. Off site power was providing power to both 'A' and 'B' train components. The entire core was off loaded to the spent fuel pool with inventory and cooling supplied by 'B' train components.

## 4. EVENT DESCRIPTION:

On May 30, 2006, at approximately 08:13 Mountain Standard Time (MST), Unit 1 experienced a valid loss of power (LOP) actuation on the train 'A' 4.16 KV safety bus (PBAS03). At the time of the event, the EDG 'A' had just been manually removed from the PBAS03 bus following a maintenance surveillance test and was slowing down after completing its post run cool down. The PBAS03 bus was powered from its normal offsite power supply when an invalid load shed signal was received from the 'A' train load sequencer which opened the normal offsite power breaker to PBAS03 bus and stripped all of the loads off the bus. This caused a valid LOP signal since PBAS03 was deenergized. The EDG 'A' received a valid emergency run signal and returned to rated frequency and voltage; however, its output breaker did not close. The closure was blocked by the 'A' train load sequencer which had stalled, thus preventing the closure signal to the EDG 'A' output breaker. The PBAS03 bus was eventually reenergized

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from its normal offsite power supply by licensed operator action. No other engineered safety feature (ESF) actuations occurred and none were required.

## 5. ASSESSMENT OF SAFETY CONSEQUENCES:

Unit 1 was defueled and no LCO entries were required. Offsite power was available to the 'A' train safety bus; however, the invalid load shed signal blocked immediate restoration of power to the 'A' train safety bus. The 'B' train was supplied by its normal offsite power; however EDG 'B' was not available due to planned outage related maintenance. The electrical grid was stable throughout the event and no irradiated fuel movement was in progress.

The event did not result in any challenges to the fission product barriers or result in the release of radioactive materials. Therefore, there were no adverse safety consequences or implications as a result of this event and the event did not adversely affect the safe operation of the plant or health and safety of the public.

The event did not result in a transient more severe than those analyzed in the updated Final Safety Evaluation Report Chapters 6 and 15. The event did not have any nuclear safety consequences or personnel safety impact.

The condition would not have prevented the fulfillment of any safety function of structures or systems as defined by 10 CFR 50.73(a)(2)(v).

## 6. CAUSE OF THE EVENT:

An investigation team was assembled to determine the cause of the event and develop actions to prevent recurrence. The team included plant engineers and industry consulting engineers. The investigation team was not able to recreate the invalid actuation signal. However, during troubleshooting and reviews of previous events caused by the load sequencer it was determined that the most probable cause for the event was from electrical noise/interference which affected the operation of the load sequencer. As a result, several modifications were recommended to reduce the electrical interference.

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The electrical interference condition has been observed only on the Unit 1 'A' train load sequencer, and as such, modifications were not recommended for the 'B' train load sequencer in Unit 1 or for Units 2 and 3.

## 7. CORRECTIVE ACTIONS:

A design modification was installed to reduce electromagnetic interference (EMI) in the sequencer. Additionally, suspect relays and noise suppression networks were replaced in the EDG control cabinet and several connections in the cabinet were reworked to further reduce the electrical noise.

The cabinet was measured for electrical noise prior to and after the installation of the modification and refurbishment. After the modification and refurbishment, the interference noise was significantly reduced. To validate the corrective actions, 16 retest runs were performed on EDG 'A' with no sequencer problems.

Any additional corrective actions taken as a result of the investigation of this event will be implemented in accordance with the APS corrective action program. If information is subsequently developed that would significantly affect a reader's understanding or perception of this event, a supplement to this LER will be submitted.

## 8. PREVIOUS SIMILAR EVENTS:

In the past three years, no similar events were reported for a LOP to a safety bus caused by a load sequencer problem.