

PRIORITY 1

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FACIL: STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Public 05000528 P
AUTH. NAME AUTHOR AFFILIATION
GRABO, B.A. Arizona Public Service Co. (formerly Arizona Nuclear Power
LEVINE, J.M. Arizona Public Service Co. (formerly Arizona Nuclear Power R
RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 95-003-00: on 950729, switchyard voltage had dropped below
administratively imposed limit of 524 kV for approx 10
seconds due to transient grid voltage. W/950827 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 6 R
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES: STANDARDIZED PLANT

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Arizona Public Service Company

PALO VERDE NUCLEAR GENERATING STATION

P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

192-00946-JML/BAG/RJH

August 27, 1995

**JAMES M. LEVINE
VICE PRESIDENT
NUCLEAR PRODUCTION**

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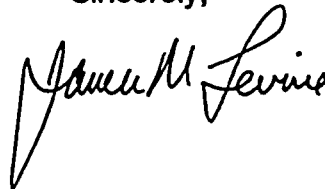
Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket Nos. STN 50-528
License Nos. NPF-41
Licensee Event Report 95-003-00**

Attached please find Licensee Event Report (LER) 95-003-00 prepared and submitted pursuant to 10CFR50.73. This LER reports an entry into Technical Specification 3.0.3 due to a transient grid voltage condition. In accordance with 10CFR50.73(d), a copy of this LER is being forwarded to the Regional Administrator, NRC Region IV.

If you have any questions, please contact Burton A. Grabo, Section Leader, Nuclear Regulatory Affairs, at (602) 393-6492.

Sincerely,



JML/BAG/RJH/pv

Attachment

cc: L. J. Callan (all with attachment)
K. E. Perkins
K. E. Johnston
INPO Records Center

50003

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PDR ADDCK 05000528
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7



LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) <div style="text-align: center; font-size: 1.2em;">Palo Verde Unit 1</div>										DOCKET NUMBER (2) 0 5 0 0 0 5 2 8										PAGE (3) 1 OF 0 5			
TITLE (4) <div style="text-align: center; font-size: 1.2em;">Entry Into Technical Specification. 3.0.3 Due To Transient Grid Voltage</div>																							
EVENT DATE (5)			LER NUMBER (6)					REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)												
MONTH	DAY	YEAR	YEAR		SEQUENTIAL NUMBER		REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES						DOCKET NUMBERS						
											N/A						0 5 0 0 0						
0 7	2 9	9 5	9 5	-	0 0 3	-	0 0	0 8	2 7	9 5	N/A						0 5 0 0 0						
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																				
<div style="text-align: center;">1</div> POWER LEVEL(10) 1 0 0			20.402(b)					20.405(c)					50.73(a)(2)(v)					73.71(b)					
			20.405(a)(1)(i)					50.38(c)(1)					50.73(a)(2)(v)					73.71(c)					
			20.405(a)(1)(ii)					50.38(c)(2)					50.73(a)(2)(vi)					OTHER (Specify in Abstract below and in Text, NRC Form 368A)					
			20.405(a)(1)(iii)					X					50.73(a)(2)(i)										
			20.405(a)(1)(iv)					50.73(a)(2)(ii)					50.73(a)(2)(viii)(B)										
20.405(a)(1)(v)					50.73(a)(2)(iii)					50.73(a)(2)(x)													
LICENSEE CONTACT FOR THIS LER (12)																							
NAME <div style="font-size: 1.2em;">Burton A. Grabo, Section Leader, Nuclear Regulatory Affairs</div>															TELEPHONE NUMBER								
															AREA CODE			6 0 2 3 9 3 - 6 4 9 2					
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																							
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs	
SUPPLEMENTAL REPORT EXPECTED (14)															EXPECTED SUBMISSION DATE (15)			MONTH	DAY	YEAR			
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)															<input checked="" type="checkbox"/> NO								
ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)																							

At approximately 1906 MST on July 29, 1995, Palo Verde Unit 1 was in Mode 1 (POWER OPERATION) operating at approximately 100 percent power when Control Room personnel were notified by the Energy Control Center (ECC) personnel that the Palo Verde switchyard voltage had dropped below the administratively imposed limit of 524 kV for approximately 10 seconds at approximately 1404 MST (the lowest voltage reading observed by ECC was approximately 523.6 kV). Because of the potential for a double sequencing event (previously reported in LER 528/93-011-01), Unit 1 requires the switchyard voltage to be at or above 524 kV for both offsite circuits to be operable. For approximately 10 seconds, Technical Specification Limiting Condition for Operation (TS LCO) 3.0.3 existed.

An investigation determined that a capacitor bank at the Pinnacle Peak switch yard experienced an "A" phase line-to-ground fault causing a grid transient. The normal voltage of approximately 529 kV decreased to a low voltage of approximately 523.6 kV and increased to a high voltage of approximately 537.7 kV, and was stabilized at approximately 532.8 kV. ECC personnel requested that MVARs be adjusted to assist in returning voltage to normal levels. No additional corrective actions were taken and none were required. Palo Verde Unit 1 entered TS LCO 3.0.3. A subsequent Engineering evaluation concluded that plant equipment/components were not impacted by the transient voltage condition.

There have been no previous similar events reported pursuant to 10CFR50.73.



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE		
Palo Verde Unit 1		YEAR	SEQUENTIAL NUMBER	REVISIO NUMBER			
	0 5 0 0 0 5 2 8	9 5	- 0 0 3	- 0 0	0 2	of	0 5

TEXT

1. REPORTING REQUIREMENT:

This LER 528/95-003-00 is being written to report an event that resulted in a condition prohibited by the plant's Technical Specifications (TS) as specified in 10 CFR 50.73(a)(2)(i).

Specifically, at approximately 1404 MST on July 29, 1995, Palo Verde Unit 1 was in Mode 1 (POWER OPERATION) operating at approximately 100 percent power when Control Room personnel (utility, licensed) were notified by the Energy Control Center (ECC) personnel (utility, non-licensed) that the Palo Verde switchyard (FK) voltage had increased and ECC requested that MVARs be adjusted to assist in returning the voltage to normal levels. At approximately 1906 MST, ECC informed Unit 1 Control Room personnel that the switchyard voltage had dropped below 524 kV for approximately 10 seconds (the lowest voltage reading observed by ECC was approximately 523.6 kV). Because of the potential for a double sequencing event, Unit 1 administratively requires that the switchyard voltage to be at or above 524 kV. For approximately 10 seconds, Technical Specification Limiting Condition for Operation (TS LCO) 3.0.3 existed.

2. EVENT DESCRIPTION:

On the afternoon of July 29, 1995, a capacitor bank at the Pinnacle Peak switchyard failed causing grid voltage on the Palo Verde switchyard bus to fluctuate between a low voltage of approximately 523.6 kV for approximately 10 seconds and a high voltage of approximately 537.7kV for approximately 4 minutes. ECC contacted the Unit 1 Control Room to adjust MVARs to lower the voltage. At this point the grid voltage was stable and the Palo Verde switchyard voltage was reduced to approximately 532.8 kV and the event was terminated. Due to the large grid perturbation to the Western Area Grid, ECC's main concern after restoring Palo Verde's nominal grid voltage was to restore nominal voltage to the remaining grid network.

Following the initial event, ECC notified the Unit 1 Control Room at 1906 MST that the event at 1404 MST had caused a low voltage of approximately 523.6 kV for approximately 10 seconds. At 1906 Unit 1 Control Room personnel made a late entry in the Control Room log and entered and exited TS LCO 3.0.3..

At the time of the event, procedure controls were available to Control Room personnel providing required actions to be performed if a degraded grid voltage condition occurred. Existing calculations demonstrate that Unit 1 requires the switchyard voltage to be at or above 524 kV, while Units 2 and 3 require the switchyard voltage to be at or above 518 kV. This difference is due to additional loads [e.g., Water Reclamation Facility (MB)] supplied from Unit 1. Station procedures require an entry into TS LCO 3.0.3 for low voltage conditions.

During this event, the administrative requirements for switchyard voltages for Unit 2 and Unit 3 were satisfied.



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE		
Palo Verde Unit 1		YEAR	SEQUENTIAL NUMBER	REVISIO NUMBER			
	0 5 0 0 0 5 2 8	9 5	- 0 0 3	- 0 0	0 3	of	0 5

TEXT

3. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THIS EVENT

As previously reported in LER 528/93-011-01 dated February 6, 1995, safety analyses calculations do not explicitly incorporate postulated Engineered Safety Features (ESF) (JE) time delays associated with the full initiation of a required ESF system which may occur during a double sequencing scenario.

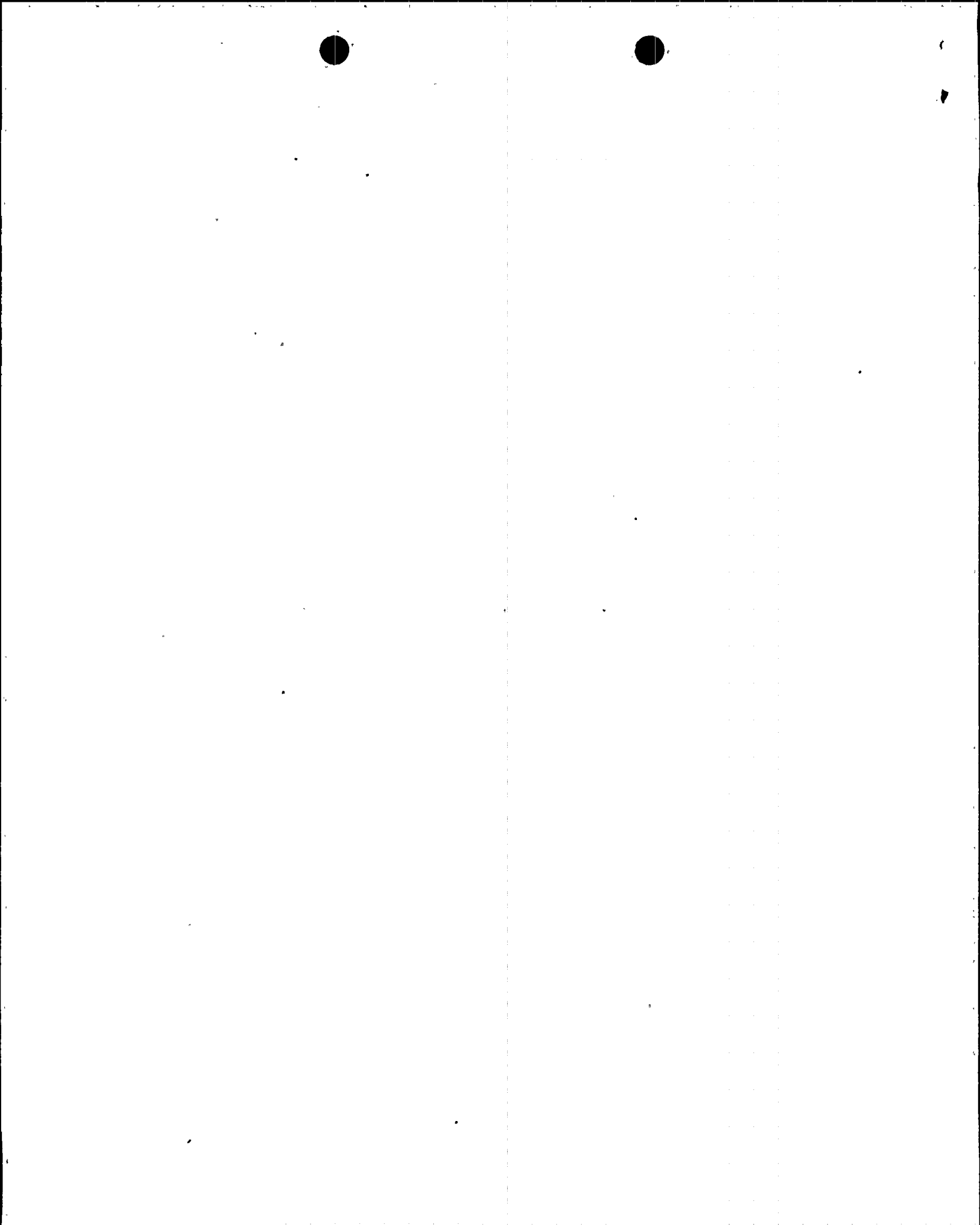
APS Engineering personnel performed an evaluation of the low voltage condition experienced during this event. Calculations concluded that under the low voltage condition of 523.6 kV, adequate voltage was present at the bus to ensure resetting of the undervoltage relays. The assumptions for this calculation include common loads, Class 1E loads from another Unit (i.e., the other Unit's startup transformer would be out-of-service), and other loads that could be manually connected following a sequencing as a result of a loss of coolant accident (LOCA) and are therefore quite conservative. Specifically for this event, the voltage at the Class 1E bus would recover to a level of 3824 volts which is well above the calculated maximum reset voltage of 3808.

During the July 29th transient grid voltage event, the bus voltage dropped to approximately 523.6 kV for approximately 10 seconds which does not meet all conditions required to permit a double sequencing event. This event is of such short duration that it was out of the range of a degraded voltage condition and would be categorized as a transient grid condition.

The event did not result in any challenges to the fission product barriers or result in any releases of radioactive materials. This event did not adversely affect the safe operation of the plant or the health and safety of the public.

4. CAUSE OF THE EVENT:

An investigation was performed in accordance with the APS Corrective Action Program. The investigation determined one of three 30 MVAR capacitor banks at the APS Pinnacle Peak station experienced an "A" phase line to ground fault. The fault duration of the capacitor bank lasted approximately 17 cycles. Operating characteristics for 230 kV breaker relays normally pick up a fault in 1.5 cycles, open the affected breaker in 3 cycles, and clear the fault in 5 cycles. The excessive fault duration time caused the distribution system grid voltage to drop (SAPL Cause Code X: Other). The Palo Verde switchyard buses experienced an increase in reactive power to approximately 1049 MVARs and a voltage transient from a low of 523.6 kV to a high of 537.7 kV. The grid was stabilized at 532.8 kV approximately 4 minutes later. No unusual characteristics of the work location (e.g., noise, heat, poor lighting) directly contributed to this event. There were no procedural or personnel errors which contributed to this event.



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE		
Palo Verde Unit 1		YEAR	SEQUENTIAL NUMBER	REVISIO NUMBER			
	0 5 0 0 0 5 2 8	9 5	- 0 0 3	- 0 0	0 4	of	0 5

TEXT

5. STRUCTURES, SYSTEMS, OR COMPONENTS INFORMATION:

Although Palo Verde Unit 1 experienced a transient grid condition that dropped below the administrative limit of 524 kV and an increase in MVARs, there are no indications that any structures, systems, or components were inoperable at the start of the event which contributed to this event. No failures of components with multiple functions were involved. Station administrative controls require an APS Engineering evaluation of electrical equipment if grid voltage is above 535.5 kV to ensure that the terminals of safety-related equipment does not exceed their design ratings. The evaluation concluded that the voltage (537.7kV) and MVAR (1069) increases did not affect operational parameters of station equipment. No failures that rendered a train of a safety system inoperable were involved. There were no safety system actuations and none were required.

6. CORRECTIVE ACTIONS TO PREVENT RECURRENCE:

Since the transmission system transient was of such short duration and caused minimal increase in Palo Verde bus voltages, no corrective actions were taken and none were required with the exception of entering TS LCO 3.0.3. The low voltage transient condition lasted approximately 10 seconds which is well below the minimum of 28.6 seconds required for the undervoltage relay double sequencing scenario to potentially occur in the event of a LOCA during this time period.

Following the event, APS personnel met with the ECC operations shift supervisor to perform a joint investigation of the effects of the transient on the APS distribution system.

7. PREVIOUS SIMILAR EVENTS:

A previous event occurred involving a momentary drop in grid voltage during a transmission line outage was reported under LER 528/95-001. No events have been reported pursuant to 10CFR50.73 which involved the same cause and sequence of events (ie., switchyard voltage drop below the administrative limit of 524 kV due to the failure of a capacitor bank on a major transmission switching station).

As discussed in section 4.0, the cause of the event reported in this LER (528/95-003) was transmission equipment failure. This equipment failure would not have been mitigated by procedural controls and additional plant monitoring equipment. Therefore, the corrective actions described in LER 528/95-001 would not have prevented this event.



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE		
Palo Verde Unit 1		YEAR	SEQUENTIAL NUMBER	REVISIO NUMBER			
		0 5 0 0 0 5 2 8	9 5 - 0 0 3 - 0 0	0 5	of	0 5	

TEXT

8. ADDITIONAL INFORMATION:

The five hour time difference between the event and the communication of the low voltage by ECC to the Unit 1 Control Room was evaluated. The time delay was appropriate given the effect the event had on the transmission system as a whole. ECC personnel would have to search through several hundred alarms to discover the time and duration of the low voltage condition since the alarm station was saturated with alarm data. ECC priorities at that time were focused on restoring the system load and stabilizing the grid. Therefore, expecting ECC to immediately contact Palo Verde Operations during this event is not reasonable.

The Plant Monitoring Computer data point printer (installed as an interim measure), that monitors transmission lines to the 525 kV switchyard, proved to be ineffective in warning the Unit 1 Control Room of the low voltage condition. The ineffectiveness is attributable to the physical location of the sensing devices, varying accuracy levels of the measuring circuits, and the inherent scanning delays of the two computer systems through which the data is transferred. This data point recorder was intended to act as an interim measure to offer some indication of switchyard voltage until a permanent alarm could be installed.

A new metering and alarm system has been designed and approved to directly sense the voltage on the East and West buses of the Palo Verde 525 kV switchyard. This system was originally scheduled for installation during the Unit 1 sixth refueling outage (September 1996 - November 1996). This modification is being considered for accelerated installation. The modification is intended to eliminate the need for ECC to contact the Unit 1 Control Room during future low voltage events.

This modification is being tracked under the APS Commitment Action Tracking System.



17