



A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear
Generating Station

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102-05587-CE/SAB/JAP/REB
October 21, 2006

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

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 3
Docket No. STN 50-530
License No. NPF 74
Licensee Event Report 2006-006-00**

Attached please find voluntary Licensee Event Report (LER) 50-530/2006-006-00 prepared and submitted pursuant to 10 CFR 50.73. The LER reports a problem with a relay contactor that caused the failure of an emergency diesel generator to attain its required voltage.

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.

Arizona Public Service Company makes no commitments in this letter.

Sincerely,

CE/SAB/JAP/REB/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

JE22

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, 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 3	2. DOCKET NUMBER 05000530	3. PAGE 1 OF 7
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4. TITLE
Voluntary LER for Failure of Emergency Diesel Generator to Attain Required Voltage Due to Relay Contactor

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
09	22	2006	2006	- 006 -	00	10	21	2006	PVNGS Unit 1	05000528
									FACILITY NAME	DOCKET NUMBER
									PVNGS Unit 2	05000529

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)									
10. POWER LEVEL 100	<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 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 checked="" 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
B	EK	CNTR	G187	Y					

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR

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

This voluntary LER is being submitted to report a condition that may be of generic concern for licensees that use an ITE A143 model field shorting contactor in their emergency diesel generator voltage circuit. On September 22, 2006 at approximately 01:18 Mountain Standard Time (MST) Unit 3 was in Mode 1, Power Operation, at approximately 100 percent rated thermal power when the A train emergency diesel generator (EDG) failed to attain its required voltage. At the time of the failure the EDG had been removed from service for planned maintenance and was being started for post maintenance surveillance testing. Engineering personnel determined the problem to be a failure of the EDG field to flash due to the field shorting contactor K1 not dropping out as required following an engine start.

The condition was corrected by straightening a metal actuator arm for an auxiliary contact module, known as the direct current (DC) Coil Switch, which allowed for more positive pressure on the auxiliary contact surfaces. The EDG was subsequently successfully started and loaded and was declared operable at 17:48 MST on September 22, 2006.

There has been no similar event reported to the NRC by Arizona Public Service in the last three years.

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		2006	-- 006	-- 00	

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

All times in this report are approximate and Mountain Standard Time (MST) unless otherwise noted.

1. REPORTING REQUIREMENT(S):

This voluntary LER (50-530/2006-006-00) is being submitted to report a condition that may be of generic concern for licensees that use an ITE A143ED12-X3 model field shorting contactor (EIS: CNTR) in their emergency diesel generator excitation circuitry. This relay may also be identified as being made by Gould or Telemecanique. Specifically, the metal actuator arm for auxiliary contacts may not be configured to ensure good pressure is applied to the auxiliary contact surfaces.

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

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 alternating current (ac) power for safe plant shutdown in the event of loss of preferred (offsite) power and for post-accident operation of engineered safety feature (ESF) loads.

The EDG field shorting contactor (size 3) is used to remove excitation from the generator during engine shutdowns. During an engine start, the K1 contactor must drop out (i.e. unlatch or open) to allow field flashing and generator output voltage buildup to occur.

3. INITIAL PLANT CONDITIONS:

Unit 3 was operating at approximately 100 percent power with the A train EDG removed from service for planned maintenance.

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4. EVENT DESCRIPTION:

On September 20, 2006 at 03:00 the A train EDG was removed from service for planned maintenance. The EDG was started at 01:18 on September 22 to perform post maintenance testing by performing the normal A train EDG operability surveillance test (40ST-9DG01). The EDG came up to rated speed but did not attain its required voltage. With the engine still running engineering personnel and maintenance personnel went to the EDG to evaluate. Inspection inside the generator control cabinet (3JDGAB02) found that the field shorting contactor (K1) was still pulled in and the Field Flash (FF) and control power (72CP1) breakers (135 VDC) were found to be on. When a voltage measurement was taken on the normally open DC Coil Switch auxiliary contact mounted on the K1 contactor, the K1 contactor dropped out allowing the EDG field to flash and the required voltage was achieved.

The EDG was shutdown and trouble shooting efforts were initiated to determine the cause of the K1 contactor failure to drop out. Inspection of the K1 contactor found that the DC Coil Switch contacts were clean, however, the switch was just barely being held closed with the K1 contactor pulled in. Good electrical continuity must exist through this contact to enable the latch mechanism on the relay to actuate that then drops the contactor out and allows the EDG field to flash.

The metal actuator arm for the alternating current (AC) auxiliary contacts mounted on the contactor armature on the opposite side of the K1 contactor was found to be straight, however, the metal actuator arm for the DC Coil Switch was found to be bent down. (See the last page of the LER for pictures). A decision was reached by engineering and maintenance to make an adjustment and straighten the metal actuator arm for the DC Coil Switch contact module. This adjustment allowed for more positive pressure on the normally open (but held closed when latched) DC Coil Switch contact surfaces (the amount of depression travel for the switch actuator was increased). The contactor was then cycled manually several times. The DC Coil Switch contacts were measured and found to be closing/opening as expected. Functional testing with the adjusted K1 re-installed in cabinet 3JDGAB02 was successfully performed five

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times to further demonstrate reliability. The EDG was successfully started and loaded on September 22, 2006 and declared operable at 17:48.

The DC Coil Switch was added to the K1 contactors by the supplier of the relay to allow use of a 125Vdc relay main coil that is required for the specific application. Recently acquired commercial data sheets for this mechanically held lighting contactor (which was adapted for use as the field shorting contactor) required the actuator arm for the DC Coil Switch to be bent out of the way (picture 2). However, no formal configuration documents that specify the correct orientation for use as a field shorting contactor have been located.

Inspection of the six K1 contactors installed in all the Palo Verde EDGs found four that were bent (picture 2) per the generic data sheets, one that had been bent but then was straightened at some later time (picture 1) and one that had never been bent (picture 3). Corrective maintenance was performed to straighten the DC Coil Switch actuator arms that were found bent.

It should be noted that on July 25, 2006 the Unit 3 A train EDG experienced a failure to attain its required voltage. The investigation into that occurrence determined that the K1 contactor auxiliary contact had improper resistance readings with the contactor in the closed state. The most probable cause of this failure was determined to be due to contamination on the contact surface either from oxide film buildup and/or from the pieces of plastic debris found in the contact area.

Corrective actions from the July 25, 2006 event included:

- Replaced K1 contactor assembly and cleaned its DC Coil Switch contact assembly for the Unit 3 A train EDG. Performed as-found resistance readings for DC Coil Switch normally open contact and functionally tested the relay on all the other 5 EDGs at Palo Verde.
- Preparations were made to remove, disassemble and clean the internal components to the DC auxiliary contact module mounted on the field shorting contactor for the other 5

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EDGs at Palo Verde. This effort was accelerated and combined with the inspection and straightening of the actuator arms after the September 22 event.

Following this July 25th event, the Unit 3 A train EDG was successfully started 4 times until the September 22 failure noted in this LER.

5. ASSESSMENT OF SAFETY CONSEQUENCES:

The plant remained within safety limits throughout the event. No ESF actuations occurred and none were required. There were no structures, systems, or components that were inoperable at the time of the event that contributed to this condition.

The condition did not prevent the fulfillment of any safety function and did not result in a safety system functional failure as defined by 10CFR50.73(a)(2)(v). Note that safety functions are: reactor shutdown, heat removal, control of the release of radioactive material, and mitigation of the consequences of an accident.

6. CAUSE OF THE EVENT:

The investigation into the cause of the EDG failure to attain its required voltage on September 22 is still underway. Preliminary results indicate that the direct cause of the condition was the failure of the K1 contactor to drop out which would have allowed the EDG field to flash.

The root cause has not yet been determined.

A supplement to this LER will be submitted if the completed investigation identifies information that significantly changes the course or consequences of the event presented in this LER.

7. CORRECTIVE ACTIONS:

All EDG K1 contactor DC Coil Switch contacts were cleaned and all actuator arms were straightened, as necessary, to provide additional pressure on the normally open contact mating surfaces. All contactors were bench and/or functionally tested.

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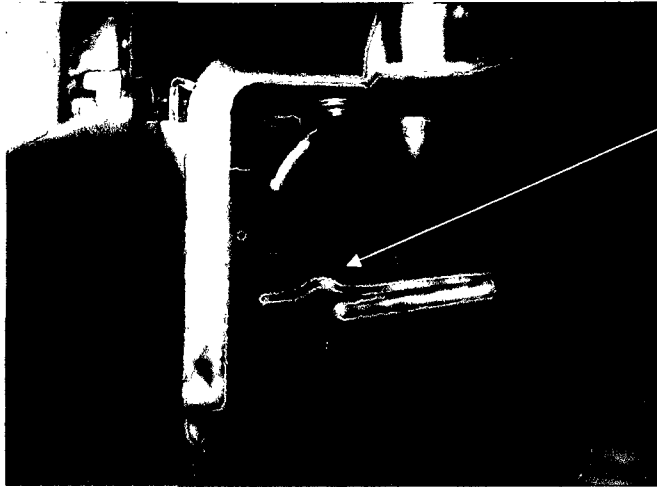
8. PREVIOUS SIMILAR EVENTS:

Arizona Public Service reported no similar event to the NRC within the last three years in which an EDG failed to attain its required voltage. LER 50-528/2005-004-00 was submitted on October 7, 2005 to report a plant shutdown required by the technical specifications due to EDG automatic voltage regulator problems. The cause of that condition is not related to the condition reported in this LER.

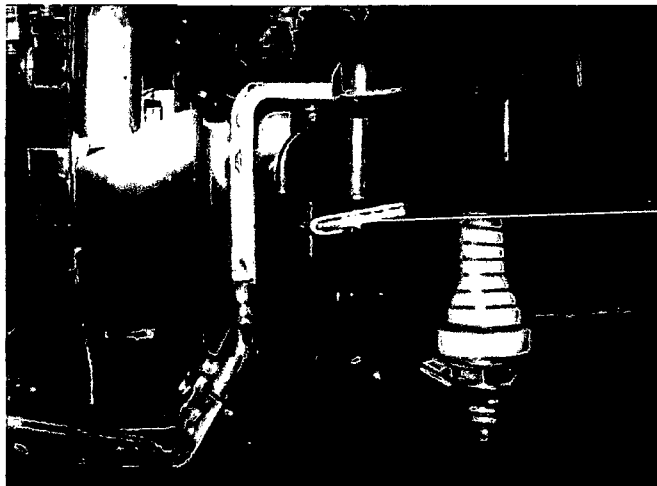
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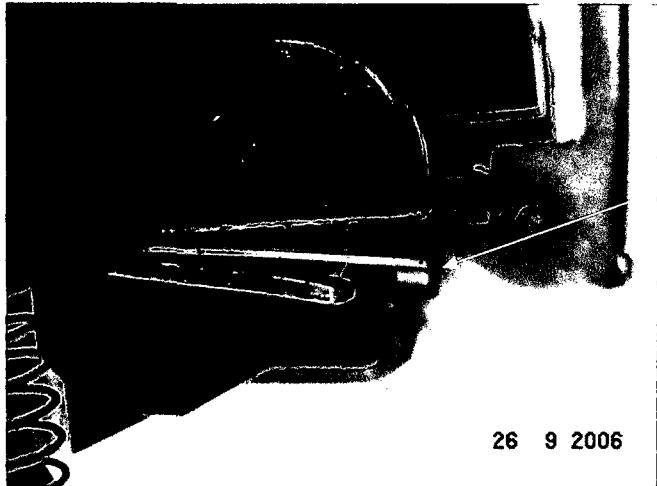
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Picture 1
Field straightened



Picture 2
Bent from manufacturer



Picture 3
Straight from manufacturer