

ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8911140309 DOC. DATE: 89/11/02 NOTARIZED: NO DOCKET #
 FACIL: STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Publi 05000528
 AUTH. NAME AUTHOR AFFILIATION
 SHRIVER, T.D. Arizona Public Service Co. (formerly Arizona Nuclear Power
 LEVINE, J.M. Arizona Public Service Co. (formerly Arizona Nuclear Power
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 89-015-00: on 890901, switchyard fire.

W/8 ltr.

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

NOTES:

05000528

	RECIPIENT ID CODE/NAME	COPIES LTTR ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR ENCL
	PD5 LA	1 1	PD5 PD	1 1
	CHAN, T	1 1	DAVIS, M.	1 1
INTERNAL:	ACRS MICHELSON	1 1	ACRS MOELLER	2 2
	ACRS WYLIE	1 1	AEOD/DOA	1 1
	AEOD/DSP/TPAB	1 1	AEOD/ROAB/DSP	2 2
	DEDRO	1 1	NRR/DEST/ESB 8D	1 1
	NRR/DEST/ICSB 7	1 1	NRR/DEST/MEB 9H	1 1
	NRR/DEST/MTB 9H	1 1	NRR/DEST/PSB 8D	1 1
	NRR/DEST/RSB 8E	1 1	NRR/DEST/SGB 8D	1 1
	NRR/DLPQ/HFB 10	1 1	NRR/DLPQ/PEB 10	1 1
	NRR/DOEA/EAB 11	1 1	NRR/DREP/RPB 10	2 2
	NUDOCS-ABSTRACT	1 1	<u>REG FILE</u> 02	1 1
	RES/DSIR/EIB	1 1	RGN5 FILE 01	1 1
EXTERNAL:	EG&G WILLIAMS, S	4 4	L ST LOBBY WARD	1 1
	LPDR	1 1	NRC PDR	1 1
	NSIC MAYS, G	1 1	NSIC MURPHY, G.A	1 1
	NUDOCS FULL TXT	1 1		
NOTES:		1 1		

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK,
 ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION
 LISTS FOR DOCUMENTS YOU DON'T NEED!

FULL TEXT CONVERSION REQUIRED
 TOTAL NUMBER OF COPIES REQUIRED: LTTR 40 ENCL 40

Arizona Public Service Company

PALO VERDE NUCLEAR GENERATING STATION
P O BOX 52034 • PHOENIX, ARIZONA 85072-2034

102-00547-JML/TDS/RKR
November 2, 1989

U. S. Nuclear Regulatory Commission
NRC Document Control Desk
Washington, D.C. 20555


Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket No. STN 50-528 (License No. NPF-41)
Licensee Event Report 89-015-00
File: 89-020-404

Attached please find voluntary Licensee Event Report (LER) No. 89-015-00. This voluntary report was prepared pursuant to guidance contained within 10CFR 50.73. In accordance with 10CFR 50.73(d), we are herewith forwarding a copy of the LER to the Regional Administrator of the Region V office.

If you have any questions, please contact T. D. Shriver, Compliance Manager at (602) 393-2521.

Very truly yours,


J. M. Levine
Vice President
Nuclear Production

JGH/TDS/RKR/kj

Attachment

cc: W. F. Conway (all w/a)
E. E. Van Brunt, Jr.
J. B. Martin
T. J. Polich
M. J. Davis
A. C. Gehr
INPO Records Center

IE22
1/1

8911140309 891102
PDR-ADOCK 05000528
S PDC



LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 60.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Palo Verde Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 5 2 8 1				PAGE (3) 1 OF 0 5		
TITLE (4) Switchyard Fire																
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 NUMBER(S)			
0 9	0 1	8 9	8 9	0 1 5	0 0	1 1	0 2	8 9	Palo Verde Unit 2				0 5 0 0 0 5 2 9			
									Palo Verde Unit 3				0 5 0 0 0 5 3 0			
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)														
POWER LEVEL (10)		20.402(b)				20.405(c)				50.73(a)(2)(iv)				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)(vii)				<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A)		
		20.405(a)(1)(iii)				50.73(a)(2)(i)				50.73(a)(2)(viii)(A)				Voluntary		
		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)(ix)						
LICENSEE CONTACT FOR THIS LER (12)																
NAME Timothy D. Shriver, Compliance Manager										TELEPHONE NUMBER AREA CODE 6 0 2 3 9 3 - 2 5 2 1						
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS						
X	F I K	C I A P I	G O 8 0	N												
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)																
<p>At approximately 1618 MST on September 1, 1989, Palo Verde Unit 1 was in a refueling outage with the core off-loaded, Palo Verde Unit 2 was in Mode 1 (POWER OPERATION) at 100 percent power and Palo Verde Unit 3 was in Mode 5 (COLD SHUTDOWN) when the "B" phase shunt reactor on the Devers transmission line at the PVNGS switchyard failed catastrophically. The failure imposed a ground fault on the Devers 500 kv line. Breakers isolating the Devers line from the PVNGS switchyard and Devers substation tripped as designed to isolate the fault and deenergize the Devers line. The failure also resulted in the release of a large volume of oil and fire. All other portions of the switchyard remained in service during and following the event.</p> <p>The cause of the shunt reactor failure was a lead failure.</p> <p>To prevent recurrence, Salt River Project (operating manager for the switchyard) will approve and review the results of switchyard component testing prior to acceptance of equipment for installation in the switchyard.</p> <p>There have been no previous similar events reported pursuant to 10CFR50.73.</p>																

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Palo Verde Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 5 2 8	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8 9	— 0 1 5	— 0 0	0 2	OF	0 5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

At approximately 1618 MST on September 1, 1989, Palo Verde Unit 1 was in a refueling outage with the core (AC) off-loaded to the Spent Fuel Pool. Palo Verde Unit 2 was in Mode 1 (POWER OPERATION) at 100 percent power. Palo Verde Unit 3 was in Mode 5 (COLD SHUTDOWN). All five transmission lines to the switchyard (FK) were in service, all switchyard breakers (FK)(BKR) were closed and all three startup transformers (XFMR) were energized.

B. Reportable Event Description (Including Dates and Approximate Times of Major Occurrences):

Event Classification: Voluntary

At approximately 1618 MST on September 1, 1989 the "B" phase shunt reactor on the Devers transmission line at the Palo Verde Nuclear Generating Station switchyard failed catastrophically. This imposed a "B" phase to ground fault on the Devers 500 kv line. Switchyard breakers 992 and 995 (FK)(BKR), which isolate the switchyard from the Devers line, both tripped as designed. The remote breakers at the Devers substation also tripped, deenergizing the Devers line. The failure also resulted in the release of a large volume of oil and a fire which damaged the "A" phase, "C" phase, and spare shunt reactor on the Devers line. Palo Verde Unit 2 and all other portions of the switchyard remained in service during and following the event. All equipment worked as designed to isolate the fault.

The shunt reactors involved in the event are part of the Devers transmission line. Southern California Edison owns the shunt reactors on the Devers line which are located in the Palo Verde switchyard for convenience. The shunt reactor is in the line to control transmission line and system voltage.

Prior to the event, on January 17, 1988 the Devers "B" phase shunt reactor failed due to a bushing failure. Southern California Edison repaired the shunt reactor and returned it to Palo Verde on August 5, 1989. The installation was performed by Salt River Project with onsite observation by Southern California Edison personnel. At approximately 0719 MST on August 31, 1989, the Devers line including the "B" phase shunt reactor was energized from the Devers substation. However, the shunt reactor and Devers line were isolated from the PVNGS switchyard. At approximately 1939 MST on August 31, 1989, the Devers line and shunt reactor were

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Palo Verde Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 5 2 8 8 9	LER NUMBER (6)			PAGE (3)		
		YEAR 8 9	SEQUENTIAL NUMBER - 0 1 5	REVISION NUMBER - 0 0		OF	0 5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

energized from the Palo Verde side and at approximately 1941 MST the line was paralleled at the Devers substation.

Hourly readings of oil temperature, oil level, oil hydrogen concentration, and gas detector relay indication were taken during the first 10 hours of energization and every other hour from approximately 0800 MST through approximately 1500 MST on September 1, 1989 when the surveillance was completed.

At approximately 1618 MST on September 1, 1989 the 'B' phase shunt reactor failed and resulted in a fire in the switchyard. The fire was extinguished at approximately 1726 MST on September 1, 1989.

- C. Status of structures, systems, or components that were inoperable at the start of the event that contributed to the event:

Not applicable - no structures, systems, or components were inoperable which contributed to this event.

- D. Cause of each component or system failure, if known:

Due to the extent of damage to the phase "B" shunt reactor, the cause of failure could not be conclusively identified. However, it appears that the most likely cause of failure was the winding to bushing conductor. An inspection of the winding to bushing conductor revealed evidence of insulation puncture and arcing below the bushing connection, and some arcing on the bushing tank wall.

- E. Failure mode, mechanism, and effect of each failed component, if known:

The failure at the phase "B" shunt reactor resulted in a phase "B" to ground fault on the Devers line. This resulted in isolation of the Devers line and shunt reactor from the PVNGS switchyard.

- F. For failures of components with multiple functions, list of systems or secondary functions that were also affected:

Not applicable - no failures of components with multiple functions were involved.

- G. For failures that rendered a train of a safety system inoperable, estimated time elapsed from the discovery of the failure until the train was returned to service:

Not applicable - no failures rendered a train of a safety system inoperable.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Palo Verde Unit 1	0 5 0 0 0 5 2 8	8 9	— 0 1 5	— 0 0	0 4	OF	0 5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

H. Method of discovery of each component or system failure or procedural error:

The isolation of the Devers transmission line was discovered by Unit 1 Control Room personnel (utility, licensed) as a result of main control board annunciators (MCBD)(ANN). Unit 1 and startup oscillograph alarms (OSG)(ALM) occurred and breakers 992 and 995 indicated open. A cloud of black smoke originating from the area of the switchyard was observed by station personnel (utility, non-licensed) who reported the fire to Fire Protection and the Unit 1 Control Room in accordance with APS policies.

I. Cause of Event:

The cause of the failure of the phase "B" shunt reactor described in Section I.B and I.D is believed to be moisture or flaws in the vertical pressboard support or flaws in the insulating tape on the lead. Routine tests of the repaired shunt reactor were performed. These tests which placed meaningful stress on the high voltage insulation were limited to a reduced level impulse test. An enhanced voltage partial discharge test was not performed. This higher voltage test may have identified any insulation problems.

J. Safety System Response:

No safety system responses occurred and none were required during this event.

K. Failed Component Information:

The failed shunt reactor was manufactured by General Electric. It is a 525000 gnd Y/303109, 50000 kva shunt reactor.

II. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THIS EVENT:

The Devers line was isolated from the switchyard as designed. The fault did not affect operation of the switchyard. All other shunt reactors installed at the Palo Verde switchyard had previously undergone impulse and enhanced voltage partial discharge tests. This shunt reactor is not safety related and is a component of the Devers transmission line. Therefore, there was no threat to the health and safety of the public.

III. CORRECTIVE ACTIONS:

A. Immediate:

PVNGS Fire Department immediately responded to the fire and

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 600 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Palo Verde Unit 1	0 5 0 0 0 5 2 8 8 9	—	0 1 5	—	0 0	0 5	OF 0 5

TEXT (If more space is required, use additional NRC Form 368A's) (17)

extinguished the fire at approximately 1726 MST on September 1, 1989.

B. Action to Prevent Recurrence:

Salt River Project (operating manager for the switchyard) will approve and review the results of switchyard component testing prior to acceptance of equipment for installation in the switchyard.

IV. PREVIOUS SIMILAR EVENTS:

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

