ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8905230017 DOC.DATE: 89/05/15 NOTARIZED: NO DOCKET #
FACIL:50-323 Diablo Canyon Nuclear Power Plant, Unit 2, Pacific Ga 05000323
AUTH.NAME AUTHOR AFFILIATION
WILSON,S. Pacific Gas & Electric Co.
SHIFFER,J.D. Pacific Gas & Electric Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 88-002-01:on 880303,reactor trip due to undetected failed relay during seismic trip channel calibr.
W/8 ltr.

DISTRIBUTION CODE: IE22D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 6
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD5 LA	1	1	PD5 PD	1	1
	ROOD,H	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	IRM/DCTS/DAB	1	1
	NRR/DEST/ADE 8H	1	1	NRR/DEST/ADS 7E	1	0
	NRR/DEST/CEB 8H	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/QAB 10	1	1
	NRR/DOEA/EAB 11	1	1	NRR/DREP/RPB 10	2	2
	NUDOCS-ABSTRACT	1	1	~~REG FILE 02~~	1	1
	RES/DSIR/EIB	1	1	RES/DSR/PRAB	1	1
	RGN5 FILE 01	1	1			
EXTERNAL:	EG&G WILLIAMS,S	4	4	FORD BLDG HOY,A	1	1
	L ST LOBBY WARD	1	1	LPDR	1	1
	NRC PDR	1	1	NSIC MAYS,G	1	1
	NSIC MURPHY,G.A	1	1			

R I D S / A D D S

R I D S / A D D S

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!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 43 ENCL 42

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
DIABLO CANYON UNIT 2	0 5 0 0 0 3 2 3	1 OF 0 5

TITLE (4) REACTOR TRIP DUE TO AN UNDETECTED FAILED RELAY DURING SEISMIC TRIP CHANNEL CALIBRATION

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 3	0 3	8 8	8 8	0 0 2	0 1	0 5	1 5	8 9		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	1
POWER LEVEL (10)	1 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (11)

- [X] 10 CFR 50.73(a)(2)(iv)
- [ ] OTHER (Specify in Abstract below and in Text, NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER AREA CODE
STEVE WILSON, REGULATORY COMPLIANCE ENGINEER	8 0 5 5 9 5 - 4 7 4 2

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X I	N R	U Y I	X 9 9 9	N					

SUPPLEMENTAL REPORT EXPECTED (14)

- [ ] YES (If yes, complete EXPECTED SUBMISSION DATE)
- [X] NO

EXPECTED SUBMISSION DATE (15) — MONTH | DAY | YEAR

ABSTRACT (16)

On March 3, 1988, at 1343 PST, with the unit in Mode 1 (Power Operation), a reactor trip and subsequent turbine trip occurred during performance of Surveillance Test Procedure (STP) I-72B, "Calibration of the Seismic Trip Channels." During performance of this STP, a simulated seismic test signal was input to the X axis of seismic sensor package number 1. This simulated test signal together with a previously undetected open coil failure of seismic trip relay K4 (sensor package number 2), in the Train B trip logic development circuit, satisfied the two-out-of-three (in one axis) logic requirements resulting in a reactor trip.

All systems functioned as designed and the unit was stabilized in Mode 3, at approximately 1424 PST. Diesel generators 2-2 and 1-3 started during the event but, by design, did not load.

The 4-hour nonemergency report required by 10 CFR 50.72 was made at 1411 PST, March 3, 1988.

The root cause for this event was attributed to the failure of the K4 seismic trip relay coil due to deterioration of the coil insulation, and the lack of seismic trip system annunciation to identify the individual protection channel component failures.

IE22
1/1

2561S/0069K

I. Initial Conditions

The unit was in Mode 1 (Power Operation) at 100 percent power.

II. Description of Event

A. Event:

On March 3, 1988, at 1343 PST, with the unit in Mode 1 (Power Operation), a reactor trip (AB) (RCT) and subsequent turbine trip (TA) (TRB) occurred during performance of Surveillance Test Procedure (STP) I-72B, "Calibration of the Seismic Trip Channels." During performance of this STP, a simulated seismic test signal was input to the X axis of seismic sensor package (IN) number 1. This simulated test signal together with a previously undetected open coil failure of seismic trip relay K4 (RLY) (sensor package number 2), in the Train B trip logic development circuit, satisfied the two-out-of-three (in one axis) logic requirements resulting in a reactor trip.

Monitoring of the logic development relays for failures is accomplished through the monitoring of a single relay in each of the three seismic sensor packages (relay K1 in sensor package 1, relay K6 in sensor package 2, and relay K7 in sensor package 3). A failure of any of these three relays is alarmed in the control room. The failure of the K4 relay was not detected prior to testing the X axis since it was not one of the three relays being monitored.

All systems functioned as designed and the unit was stabilized in Mode 3, at approximately 1424 PST. Diesel generators (EK) (DG) 2-2 and 1-3 started during the event but, by design, did not load.

Prior testing had been satisfactorily performed on the Z axis.

The 4-hour nonemergency report required by 10 CFR 50.72 was made at 1411 PST, March 3, 1988.

B. Inoperable structures, components, or systems that contributed to the event:

Seismic trip relay K4

C. Dates and approximate times for major occurrences:

1. March 3, 1988, 1343 PST: Event date.

2. March 3, 1988, 1411 PST: The 4-hour nonemergency report required by 10 CFR 50.72 was made.

3. March 3, 1988, 1424 PST: The unit was stabilized in Mode 3.

D. Other systems or secondary functions affected:

None

E. Method of discovery:

The event was immediately apparent due to alarms and indications in the control room.

F. Operator actions:

The operators followed the appropriate procedures and placed the unit in a stable condition in Mode 3 (Hot Standby).

G. Safety system responses:

1. The reactor trip breakers (JC) (BKR) opened.

2. The control rod drive mechanisms (AA) (DRIV) allowed the control rods to drop into the reactor.

3. The turbine tripped.

4. Diesel generators 2-2 and 1-3 started but, by design, did not load.

5. The main feedwater system isolated and auxiliary feedwater automatically started to maintain steam generator water level.

III. Cause of Event

A. Immediate cause:

Reactor trip breakers opened as a result of a signal from the seismic trip logic.

B. Root cause:

A laboratory analysis of the failed relay was conducted. The failure analysis focused on three areas: (1) misalignment between contacts; (2) ability to sustain a continous overvoltage; and (3) location and cause of coil failure. Based on this analysis and an evaluation of the system, the root cause for this event was attributed to the failure of the K4 seismic trip relay coil due to deterioration of the coil insulation, and the lack of adequate seismic trip system annunciation to identify the individual protection channel component failures. Contact misalignment did not contribute to this particular event.

Deterioration of the coil insulation was caused by overheating due to the use of a 135.7 Vdc power supply voltage rather than the 110 Vdc power supply voltage that the coil was nominally rated for. The manufacturer states that the maximum acceptable voltage for sustained operation is 137 Vdc at 25°C. The seismic trip system was a vendor supplied package for Diablo Canyon. The seismic trip system relay coil selection was based on a standard 125 Vdc power supply to the system, and the system operated on the upper voltage band (135.7 Vdc) most of the time due to an added battery float of 10.7 Vdc. Since the maximum relay ratings were not exceeded, the design was determined to be acceptable. However, the applied supply voltage of 135.7 Vdc produces a 52% increase in coil heat over the heat generated at the 110 Vdc rated value, thus derating the expected relay coil life. The use of 110 V dc nominal relays in the seismic trip system will be eliminated through implementation of Corrective Action C as noted below in Section V.

IV. Analysis of Event

A reactor trip from 100 percent power is a previously analyzed Condition II event. Since all systems functioned as designed there were no unanalyzed safety consequences or implications from this event.

V. Corrective Actions

A. Failed relay K4 has been replaced and tested in accordance with STP I-72B. STP I-72B has been revised to require visual inspection of the logic relays prior to testing. This revision was made to ensure none of the relays are in the de-energized state prior to testing.

B. Status indicating lights for the seismic trip logic relays were added to Unit 2 during the past refueling outage. These status lights were added to provide position indication of the actual trip contacts of the logic relays during surveillance testing. However, these status lights do not provide indication of possible conductivity through the actual trip contacts. An exemption from performing the seismic trip actuating device operational test during Unit 1 Cycle 3 operations was granted by the NRC on December 29, 1988.

C. PG&E will upgrade the seismic trip system to feed signals from the seismic system trip sensors directly into the Solid State Protection System. This design change will eliminate the coincident logic relay portion of the current system, which has been the source of most of the past problems with the seismic trip system. The upgraded system design will be more reliable, maintainable, and testable than the existing system. PG&E has presently scheduled installation of the upgraded system during the third refueling outages of each unit (October 1989 for Unit 1 and February 1990 for Unit 2).

VI. Additional Information

A. Failed components:

Seismic trip relay K4
Manufacturer: Midtex
Model No. 156-14F2B6

B. Previous LERs on similar events:

LER 1-86-010-01: A reactor trip and subsequent turbine trip occurred when a reactor trip breaker opened while the shunt trip mechanism was being prepared for testing.

The corrective actions for the above LER would not have prevented the event reported in this LER since it did not involve the failure of a seismic trip relay.

Pacific Gas and Electric Company

77 Beale Street
San Francisco, CA 94106
415/972-7000
TWX 910-372-6587

James D. Shiffer
Vice President
Nuclear Power Generation

May 15, 1989

PG&E Letter No. DCL-89-136

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

Re: Docket No. 50-323, OL-DPR-82
Diablo Canyon Unit 2
Licensee Event Report 2-88-002-01
Reactor Trip Due to an Undetected Failed Relay During Seismic Trip Channel Calibration

Gentlemen:

PG&E is submitting the enclosed Licensee Event Report revision concerning the reactor trip on March 3, 1988, due to an undetected failed relay during a seismic trip channel calibration. This revision provides the root cause of the reactor trip and the corrective actions to prevent recurrence.

This event has in no way affected the public's health and safety.

Kindly acknowledge receipt of this material on the enclosed copy of this letter and return it in the enclosed addressed envelope.

Sincerely,

J. D. Shiffer

cc: J. B. Martin
P. P. Narbut
H. Rood
M. M. Mendonca
B. H. Vogler
CPUC
Diablo Distribution
INPO

Enclosure

DC2-88-TI-N019

2561S/0069K/ALN/1999

IE22
1/1