NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

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 6

TITLE (4) WIRING ERROR CAUSES THE INOPERABILITY OF FEEDWATER ISOLATION VALVE FCV-439

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)
1 0	0 5	8 5	8 5	0 1 4	0 1	0 3	1 1	8 5		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		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	TELEPHONE NUMBER
DAVID P. SISK, REGULATORY COMPLIANCE ENGINEER	AREA CODE 8 0 5 — 5 9 5 - 7 3 5 1

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

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On September 6, 1985, circuit protection fuses blew several times in the control circuit (required to be operable in Modes 1-4) for FCV-439 (Steam Generator 2-2 Main Feedwater Isolation Valve). The circuit was checked for continuity and no apparent cause was found. The event was assumed to be spurious and the fuse was replaced. Unit 2 entered Mode 4 (Hot Shutdown) on October 5, 1985, with FCV-439 inoperable, which is in violation of Technical Specification (T.S.) 3.3.2, Table 3.3-3. On October 24, 1985, FCV-439 failed to close following a P-14 (Steam Generator Hi-Hi Level Permissive) signal (see LER 2-85-010) due to a burnt-out control circuit transformer. The transformer was replaced and tested satisfactorily and FCV-439 was declared operable at 0230 PDT October 25, 1985. On October 31, 1985, FCV-439 again failed to close on a P-14 signal due to a burnt-out control circuit transformer. A detailed investigation following this occurrence determined that all three of the above events were caused by a wiring error (personnel error) involving the circuitry for slave relay K621. The transformer was replaced, the wiring corrected and FCV 439 declared operable on November 1, 1985. All similar relays have been functionally tested. A Maintenance Bulletin was issued to reemphasize the importance of checking the equipment history data base prior to performance of corrective maintenance.

0711S/0042K

IE22
1/1

★ U.S.GPO: 1984-0-464-461/18799

I. Initial Conditions

The unit was in Mode 5 (Cold Shutdown) during the performance of startup testing with a Reactor Coolant System temperature of 195 degrees Fahrenheit and pressure of 350 psig.

II. Description of Event

A. Event:

1. On September 6, 1985, a problem was observed by personnel performing a surveillance test procedure (STP) on FCV-439 (Steam Generator 2-2 Main Feedwater Isolation Valve)(SJ)(ISV) when the control circuit protection fuse blew several times. No cause could be found for the blown fuses. Since the event failed to repeat during the troubleshooting, the first blown fuse was assumed to be spurious and the subsequent failures were attributed to difficulties in testing the system. The control circuit was checked for continuity, and proper valve operation was verified by using the control room control switch. The system was then declared operable.

2. On October 5, 1985, Unit 2 entered Mode 4 (Hot Shutdown) with FCV-439 inoperable, which is in violation of Technical Specification (T.S.) 3.3.2, Table 3.3-3, item 1.

3. On October 24, 1985, at 1128 PDT, with the unit in Mode 1 (Power Operation), FCV-439 failed to close as designed on a P-14 (Steam Generator Hi-Hi Level Permissive) signal (see LER 2-85-010). Technicians identified that FCV-439 control circuit transformer (SJ)(XFMR) had burnt out. This event was attributed to a random component failure. The transformer was replaced and tested satisfactorily, and FCV-439 was declared operable at 0230 PDT, October 25, 1985.

4. On October 31, 1985, at 1323 PST, with the unit in Mode 1 (Power Operation), FCV-439 again failed to close as designed on a P-14 signal. A second failure of the same component in such a short period of time prompted a detailed investigation, which disclosed that the failure to close was caused by a wiring error involving main control board circuitry for slave relay K621 (SJ)(RLY). The transformer was replaced and the wiring corrected, thus making the valve operable. The Limiting Condition for Operation (LCO) of Technical Specification 3.3.2 was exited at 0404 PST, November 1, 1985.

5. On November 7, 1985, during the first available outage, the valve operator system wiring was rechecked against the wiring drawings. The wiring was found to be functionally correct.

6. A Field Change Transmittal (FCT) was issued to correct a connection drawing to be consistent with other electrical drawings. After the wiring was corrected to its intended configuration, all four feedwater isolation valves were operated using relay K621 and determined to work satisfactorily.

7. Further analysis of the event showed that in March 1983, preoperational Startup Test 33.2 had demonstrated the wiring to be functionally correct. An investigation concluded that a wiring error was made sometime between March 1983 (when the startup test was completed) and September 6, 1985 (when the fuse failures were first noted). The wiring error caused the FCV-439 control circuit transformer and fuse failures which resulted in the inability of the associated instrument channels to meet the LCO of Technical Specification 3.3.2, Table 3.3-3, items 1 and 5 (which require feedwater isolation upon a safety injection (SI) or P-14 signal. The circuit was wired in accordance with an approved November 1982 revision of a PGandE connection drawing which may have contributed to the termination error.

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

None

C. Dates and approximate times for major occurrences:

1. March 1983: Preoperational Startup Test 33.2 demonstrated the wiring to be functionally correct.

2. Between March 1983, and September 6, 1985: a wiring change was made for which documentation cannot be located.

3. September 6, 1985: Fuses blew in the FCV-439 control circuit.

4. October 5, 1985: Event Date - Unit 2 entered Mode 4 .

5. October 24, 1985 at 1128 PDT: FCV-439 fails to close on P-14 signal. FCV-439 transformer burnt out.

6. October 31, 1985 at 1323 PST: Discovery Date - FCV-439 fails to close on P-14 signal. FCV-439 transformer burnt out. Wiring error identified and corrected. Exited the LCO at 0404 PST, November 1, 1985.

7. November 7, 1985: Wiring returned to intended configuration and functionally tested.

D. Other systems or secondary functions affected:

None

E. Method of discovery:

An investigation was initiated upon equipment history review after second failure of FCV-439 control system transformer.

F. Operation actions:

Not applicable

G. Safety systems responses:

Not applicable

III. Cause of Event

A. Immediate cause:

Incorrect wiring terminations in a control system to FCV-439 caused control circuit fuse to burn out or control circuit transformer to fail upon SI or P-14 signal with FCV-439 open.

B. Root cause:

The root cause is attributed to personnel error (cognitive) because of the following circumstances:

1. A wiring change was made for which documentation cannot be located. The circuit was wired in accordance with an approved November 1982 revision of a PGandE connection drawing which was not consistent with other electrical drawings.

2. Cause for fuse failures was not found during the initial troubleshooting by plant technicians since the short-circuit condition was only introduced from slave relay actuation. The valve functioned normally when actuated from the control board. A special continuity test circuit is provided for components, such as the feedwater isolation valves, which cannot be exercised during operation. This permits testing the associated slave relay during operation and verifies actuation circuit continuity. Although the circuit continuity test will normally discover wiring errors and equipment failures, this specific wiring error could only be discovered during a functional test.

3. Equipment history data base on FCV-439 was not examined during investigation of the October 24, 1985, event.

IV. Analysis of Event

Reduction of feedwater flow is assumed as a mitigating action in the excessive feedwater flow and steamline break (core response and mass/energy release) analysis. The means of achieving feedwater flow reduction are:

A. Feedwater isolation valve closure.

B. Feedwater regulation and bypass valve (SJ)(FCV) closure.

C. Main feedwater pump (SJ)(P) trip.

The feedwater pump trip function was operational and the feedwater regulation and bypass valves were operational with closure times faster than the required isolation valve closure time. Since reduction of feedwater flow consistent with the FSAR assumptions was available, no adverse safety consequences or implications resulted from this event.

V. Corrective Actions

A. A review of operational and surveillance records was performed to locate similar slave relay operations that had not been functionally tested or verified to have been actuated when required during previous plant operation and that receive an actuation signal from a single Solid State Protection System (SSPS) train. The review indicated that one additional slave relay (on Main Feedwater Pump (MFP) 2-2) was found that had not been called upon to operate (either operationally or as part of a surveillance). The MFP 2-2 slave relay was functionally tested and found to operate satisfactorily.

B. The multiple channel engineered safety features (ESFs) that are normally tested by a continuity check were functionally tested by actuation from its associated slave relay(s) during January and February 1986.

C. Both Diablo Canyon Power Plant and General Construction records were checked, and no documentation was found that showed when the erroneous terminations were made. Since this event was caused by personnel error (cognitive), the work controls in their present form have been determined to be satisfactory and not at fault during this event.

D. A Maintenance Bulletin was issued to all electrical maintenance personnel reemphasizing the importance of the checking equipment history data base prior to performance of corrective maintenance. This bulletin has also been sent to training for inclusion in general maintenance training.

E. Although not a direct cause of this event, postmaintenance testing was also reviewed. To provide additional assurance that proper postmaintenance testing is conducted on safety-related components, Administrative Procedure C-6S3, "Post Maintenance Testing," was revised in February 1986 to require that the organization performing maintenance review the postmaintenance testing plan to ensure that it adequately tests equipment features affected by the maintenance or modification.

VI. Additional Information

A. Failed components:

None

B. Previous LERs on similar events:

None

PACIFIC GAS AND ELECTRIC COMPANY

PG&E — 77 BEALE STREET • SAN FRANCISCO, CALIFORNIA 94106 • (415) 781-4211 • TWX 910-372-6587

JAMES D. SHIFFER
VICE PRESIDENT
NUCLEAR POWER GENERATION

March 11, 1986

PGandE Letter No.: DCL-86-068

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

Re: Docket No. 50-323, OL-DPR-82
Diablo Canyon Unit 2
Licensee Event Report 2-85-014-01
Wiring Error Causes the Inoperability of Feedwater Isolation Valve FCV-439

Gentlemen:

Pursuant to 10 CFR 50.73(a)(2)(i)(B), PGandE is submitting the enclosed revision to Licensee Event Report 2-85-014-00 to provide a more detailed explanation of the event.

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,

for J. D. Shiffer

Enclosure

cc: L. J. Chandler
R. T. Dodds
J. B. Martin
B. Norton
H. E. Schierling
CPUC
Diablo Distribution
INPO

0711S/0042K/RHM/38

IE22
1/1