

CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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 FACIL:50-275 Diablo Canyon Nuclear Power Plant, Unit 1, Pacific Ga 05000275
 50-323 Diablo Canyon Nuclear Power Plant, Unit 2, Pacific Ga 05000323
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 POWERS,R.P. Pacific Gas & Electric Co.
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 98-002-00:on 980314,TS 4.3.1.1 not met due to inadequate surveillance test procedure.Units 1 & 2 UV & UF relays were. satisfactorily tested.W/980406 ltr.

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Pacific Gas and Electric Company

Diablo Canyon Power Plant
P.O. Box 56
Avila Beach, CA 93424
805/545-6000

Robert P. Powers
Vice President—Diablo Canyon
Operations and Plant Manager

April 6, 1998

PG&E Letter DCL-98-051



U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Licensee Event Report 1-1998-002-00
Technical Specification 4.3.1.1 Not Met Due to Inadequate Surveillance Test Procedure

Dear Commissioners and Staff:

PG&E is submitting the enclosed licensee event report regarding Technical Specification 4.3.1.1, "Reactor Trip System Instrumentation," not met due to an inadequate surveillance test procedure that resulted in the failure to verify the surveillance requirement.

This event did not adversely affect the health and safety of the public.

Sincerely,

A handwritten signature in black ink, appearing to read 'R. P. Powers'. The signature is fluid and cursive.

Robert P. Powers

cc: Steven D. Bloom
Ellis W. Merschoff
Kenneth E. Perkins
David L. Proulx
Diablo Distribution
INPO

Enclosure

DDM/2246/N0002057

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S PDR



LICENSEE EVENT REPORT (LER)

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TITLE (4)
Technical Specification 4.3.1.1 Not Met Due to Inadequate Surveillance Test Procedure

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MO	DAY	YEAR	FACILITY NAME		DOCKET NUMBER
03	14	1997	1998	- 0 0 2	- 0 0	04	06	1998	Diablo Canyon Unit 2		0 5 0 0 0 3 2 3

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11) <input checked="" type="checkbox"/> 10 CFR 50.73(a)(2)(i)(B) <input type="checkbox"/> OTHER _____ (SPECIFY IN ABSTRACT BELOW AND IN TEXT, NRC FORM 366A)
POWER LEVEL (10)	
1 0 0	

LICENSEE CONTACT FOR THIS LER (12)

Vickie A. Backman - Senior Regulatory Services Engineer	TELEPHONE NUMBER
	AREA CODE: 805 NUMBER: 545-4289

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	E A	8 1	B 0 9 3	Yes					

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

ABSTRACT (Limit to 1400 spaces. i.e., approximately 15 single-spaced typewritten lines.) (16)

On March 6, 1998, with Unit 1 in Mode 1 (Power Operation) at 100 percent power and Unit 2 in Mode 6 (Refueling) with the core offloaded to the spent fuel pool, PG&E identified that Technical Specification (TS) 3/4.3.1, "Reactor Trip System Instrumentation," Table 4.3-1, items 15 and 16, had not been met since March 1997. This TS requires the performance of a trip actuating device operational test of the reactor coolant pump undervoltage (UV) and underfrequency (UF) relay inputs to the reactor trip system instrumentation.

A PG&E engineer investigating the failure of a Unit 2 relay identified that the existing Surveillance Test Procedure (STP) I-9A, "12 kV Bus RCP U/F and U/V Trip Actuating Device Operational Test," did not adequately verify operability. Unit 1 entered TS 4.0.3 at 1000 PST. Following satisfactory surveillance testing, TS 4.0.3 was exited at 1645 PST. The Unit 2 relays were verified operable during refueling outage surveillance tests.

The root cause was determined to be personnel error (cognitive) by PG&E personnel who revised STP I-9A in 1997.

Corrective actions include: retesting UV and UF relays, rescinding STP I-9A, reviewing similar relay tests, and reviewing recent quality issues. A case study of this event will be provided to appropriate procedure writers and independent technical review personnel to emphasize the lessons learned from this event.



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I. Plant Conditions

Units 1 and 2 have been in various Modes during the condition.

II. Description of Problem

A. Summary

On March 6, 1998, with Unit 1 in Mode 1 (Power Operation) at 100 percent power and Unit 2 in Mode 6 (Refueling) with the core offloaded to the spent fuel pool, PG&E identified that Technical Specification (TS) 3/4.3.1, "Reactor Trip System Instrumentation," Table 4.3-1, items 15 and 16, had not been met since March 1997. This TS requires the verification of the reactor coolant pump (RCP) undervoltage (UV) and underfrequency (UF) relay (EA)(81) input to the reactor trip system instrumentation.

B. Background

The solid state relays used in the UF and UV applications are deenergized under normal plant voltage and frequency conditions. Upon sensing an UF or UV condition, the relay output coil is energized, opening the output contacts and removing the input to the solid state protection system (SSPS). The relays have a 'pickup' light emitting diode (LED) that indicates the demand to open the contacts, but does not monitor actual contact opening.

TS 4.3.1.1, "Surveillance Requirements," Table 4.3-1, "Reactor Trip System Instrumentation Surveillance Requirements," requires performance of a quarterly trip actuating device operational test (TADOT) for the UV and UF RCP relays. A TADOT requires the operation of the device to verify operability of alarm, interlock, and trip functions. The TADOT also requires adjustment, as necessary, of the trip actuating device to the required setpoint within the required accuracy.

Surveillance Test Procedure (STP) I-9, "12 kV Bus RCP U/F and U/V Channels Calibration and Time Response Test," performs a complete surveillance of components and time response functions of the RCP UV and UF relays. STP I-9 is required to be performed each refueling outage; however, it may be performed quarterly, as all requirements of a TADOT are satisfied by the test. STP I-9 uses multiple test equipment



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components to perform a complex timing test. STP I-9 verifies the contact state of the UV or UF relays with test equipment. In addition, verification and adjustment, if required, of the trip actuating device setpoint is provided using the installed output relay LED.

STP I-9A, "12 kV Bus RCP U/F and U/V Trip Actuating Device Operational Test," performs a TADOT of the RCP UV and UF features on a quarterly basis. In Revision 12, this STP utilized test equipment to individually verify UF and UV relay contact state. However, Revision 12 was rescinded during 1996 and STP I-9 was performed to fulfill both quarterly and refueling surveillance requirements instead.

C. Event Description

On November 19, 1996, and November 20, 1996, for Units 1 and 2, respectively, STP I-9 was satisfactorily performed to verify operability for 12 kV Buses D and E as a quarterly TADOT.

On January 2, and January 3, 1997; the UV relays for Bus D on Units 1 and 2 respectively; and on January 8, 1997, the UV and UF Bus D relays for Unit 2; were satisfactorily tested with STP I-9.

On February 13, 1997, due to test equipment concerns, STP I-9A was reinstated using a revised methodology in Revision 13, in order to perform the quarterly TADOT testing. The revision did not use test equipment to verify contact state as was done in previous STP I-9A revisions and also in STP I-9. Instead, the test used the installed output relay LED as an indication of relay contact position. Since the output LED indicates the actuation demand to open the contacts instead of actual contact position, STP I-9A, Revision 13, was inadequate.

On February 14, 1997, the inadequate STP I-9A Revision 13 was performed on Units 1 and 2 UF and UV 12 kV Bus E relays.

On March 14, and March 15, 1997, for Units 1 and 2 respectively, the surveillance interval required by TS 4.3.1.1, Table 4.3-1, items 15 and 16, including the allowed extension of TS 4.0.2, was exceeded for 12 kV UV and UF Bus E relays.

On April 17, 1997, the Unit 1 UV and UF 12 kV relays were satisfactorily tested with STP I-9 during the Unit 1 eighth refueling outage.



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On April 27, and May 3, 1997, respectively, the Unit 2 UV and UF relay surveillance interval was exceeded for Bus D.

On August 10, 1997, the Unit 1 UV and UF relays surveillance interval was exceeded for Bus D.

On March 5, 1998, a technician identified a failure of a UF relay (81VDR2) during bench testing of equipment removed from service during the Unit 2 eighth refueling outage (2R8). The relay had operated as one of three UF relays for Bus D during the previous fuel cycle.

The failure identified during this event was a failure of the output relay contacts to open when required (failed as-is in the closed position). This failure was not detectable by the manufacturer's installed 'pickup' LED as this indicates a demand to open the contacts and not actual contact status as originally believed by the procedure author and reviewer.

On March 6, 1998, a PG&E engineer investigating the failed relay identified that STP I-9A, Revision 13, did not provide adequate verification of UV and UF relay operability.

On March 6, 1998, Unit 1 plant operators entered TS 4.0.3 at 1000 PST.

On March 6, 1998, plant operators exited TS 4.0.3 following satisfactory performance of STP I-9 for all Unit 1 UV and UF relays at 1645 PST.

The Unit 2 UV and UF relays were satisfactorily tested by scheduled performance of STP I-9 prior to restart of the unit following 2R8.

D. Inoperable Structures, Components, or Systems that Contributed to the Event

None.

E. Dates and Approximate Times for Major Occurrences

1. March 14 and 15, 1997: Event date: TS 4.3.1.1 surveillance interval and the allowed TS 4.0.2 extension was first exceeded for Units 1 and 2.



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2. March 6, 1998: Discovery date: An engineer identified that STP I-9A was inadequate.

3. March 6, 1998, at 1000 PST: TS 4.0.3 was entered for Unit 1.

4. March 6, 1998, at 1645 PST: TS 4.0.3 was exited for Unit 1 following satisfactory testing.

F. Other Systems or Secondary Functions Affected

None.

G. Method of Discovery

A PG&E nonlicensed engineer investigating a failed UF relay identified that STP I-9A was inadequate.

H. Operator Actions

Plant operators entered TS 4.0.3 for Unit 1 and following satisfactory retesting exited the applicable TS.

I. Safety System Responses

None.

III. Cause of the Problem

A. Immediate Cause

STP I-9A, Revision 13, was inadequate, in that the relay output contact position was not verified.

B. Root Cause

The root cause was determined to be personnel error (cognitive) by PG&E nonlicensed personnel during the preparation and independent review of STP I-9A, Revision 13. PG&E personnel believed that the installed output LED satisfactorily demonstrated the relay output contact function based



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upon use within STP I-9. However, STP I-9 performs the timing test by using test equipment to verify operability. The LED is relied upon for setpoint adjustment only. The procedure preparer and independent reviewer failed to perform a point by point verification of STP I-9A.

IV. Analysis of the Event

The function of the UV and UF relays is to protect against a Final Safety Analysis Report (FSAR) Update Condition III (infrequent faults) event, a complete loss of forced reactor coolant system (RCS) flow that may result from a simultaneous loss of electrical supplies to all RCPs.

The RCP 12 kV bus UV relays are provided to trip the reactor on a loss of offsite power condition.

The RCP 12 kV UF relays are provided to open the RCP breakers and trip the reactor for a UF condition resulting from a major power grid disturbance. Opening the breakers disengages the RCPs from the power grid so that the RCP flywheel kinetic energy is available for full coastdown.

The FSAR evaluation assumes that the reactor trip occurs as the result of the UV relay protection (1-out-of-2 per bus in both busses) or UF relay protection (2-out-of-3 per bus in either bus). The FSAR analysis demonstrates that for complete loss of forced RCS flow, the departure from nucleate boiling ratio does not decrease below the safety analysis limit values during the transient, and thus, no core safety limit is violated.

Following identification of this condition in Unit 2, all of the UV and UF relays were satisfactorily tested and declared operable for Unit 1. The failed relay (81VDR2) identified in Unit 2 is one of three UF relays connected to 12 kV Bus "D." Subsequent surveillance testing confirmed that the redundant Bus D UF relays (two of three), all three Bus E UF relays, and all Unit 2 UV relays were operable throughout the time period that the inadequate surveillance had been performed. Therefore, if a complete loss of electrical supplies occurred, both the UV and UF trip functions would have been initiated as required on both units.

Finally, if any or all of the UV or UF relays failed to perform their intended function, the RCS low flow reactor trip function would have initiated a reactor trip to provide protection against possible core damage.



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Based upon the above analysis, the health and safety of the public were not adversely effected, and there were no adverse consequences or safety implications resulting from this event.

V. Corrective Actions

A. Immediate Corrective Actions

1. Units 1 and 2 UV and UF relays were satisfactorily tested.
2. STP I-9A was rescinded.
3. Other STPs utilized to test similar electronic relay actuation were verified adequate.
4. A review of recent quality issues and searches for other instances of inadequate STP preparation confirmed that this is an isolated error and is not indicative of a programmatic problem.

B. Corrective Actions to Prevent Recurrence

A case study regarding this event will be provided to appropriate surveillance test authors and independent technical reviewers to emphasize the lesson learned of thoroughly understanding the internal configuration of equipment to provide adequate testing.

VI. Additional Information

A. Failed Components

UF relay Manufactured by Basler Electric Co., Model BE1-81 O/U, Type T3G-E1J, Style A6N2F.

B. Previous LERs on Similar Problems

LER 1-97-016, "Technical Specification 3.3.1 and 3.3.2 Not Met Following Inadequate Surveillance Testing of Reactor Trip/ESF Functions Due to Inadequate Vendor Design Information Discovered as a Result of Generic Letter 96-01," identified a condition where some interlock and trip functions were not adequately tested by the SSPS semiautomatic tester. The corrective actions included additional testing of the specific



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equipment involved. The corrective actions taken would not have prevented this event due to the unrelated nature of the event and equipment involved.

