January 18, 2006

PG&E Letter DCL-06-009

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

Docket No. 50-323, OL-DPR-82
Diablo Canyon Unit 2
Licensee Event Report 2-2005-002-00
Unplanned Emergency Diesel Generator Auto-start During Testing
Due to Personnel Error in Relay Testing

Dear Commissioners and Staff:

In accordance with 10 CFR 50.73(a)(2)(iv)(A), Pacific Gas and Electric Company is submitting the enclosed licensee event report regarding a system actuation when relay testing inadvertently resulted in loss of startup power and all three Unit 2 Emergency Diesel Generators started. This system actuation was due to a personnel error in relay testing.

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

Sincerely,

James R. Becker

ssz/2246/A0652421
Enclosure
cc/enc: Terry W. Jackson, NRC Senior Resident Inspector
Bruce S. Mallett, NRC Region IV
Alan B. Wang, NRR Project Manager
INPO
Diablo Distribution

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

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.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Diablo Canyon Unit 2	05000323	1 OF 6

4. TITLE

Unplanned Emergency Diesel Generator Auto-start During Testing Due to Personnel Error in Relay Testing

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
11	19	2005	2005	- 002 -	00	01	18	2006	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE

1

10. POWER LEVEL

100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Lawrence M. Parker – Senior Regulatory Services Engineer	(805) 545-3386

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
				No					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On November 19, 2005, at 15:51 PST, with Unit 1 in Mode 6 (Refueling) and Unit 2 in Mode 1 (Power Operation), relay testing resulted in a sudden pressure relay trip of the Unit 1 startup transformer (SUT) 1-1, resulting in a loss of startup power to both units. All three Unit 2 Emergency Diesel Generators (EDGs) started as designed. Unit 2 power continued to be supplied from the auxiliary transformers. Unit 1 was unaffected as startup power was cleared for maintenance. At 16:15 PST, Operations cut out the sudden pressure relay on SUT 1-1 and restored 230kV offsite power to Unit 2. Plant operators made a nonemergency event notification (EN 42157) in accordance with 10 CFR 50.72(b)(3)(iv)(A) at 1721 PST.

This event was due to human performance errors in that utility personnel failed to review applicable drawings and take appropriate actions prior to relay testing. Contributing causes included failure to implement testing standards, inconsistent relay work package quality, and inadequate procedural guidance.

Corrective actions involve improved training, work order revisions, procedure enhancements, and process simplifications to ensure consistent testing standards are met.

I. Plant Conditions

Unit 2 was in Mode 1 (power operation) at approximately 100 percent power. Unit 1 was in Mode 6 (refueling) as scheduled for the thirteenth refueling outage with core reload in progress and startup power cleared for scheduled maintenance.

II. Description of Problem

A. Background

Unit 1 startup transformer (SUT) 1-1 is an ABB 75 MVA power transformer with a Reinhausen load tap changer (LTC). The transformer utilizes two independent oil systems: The first is the main oil system which houses the transformer core and main windings. The second oil system houses the load tap changer contacts and other moving parts. When the LTC responds to varying voltage levels, the LTC will open and close numerous contacts under load that will generate heat and combustible gases. An oil pump will then be started to filter any moisture or arc products that are generated. If the LTC generates excessive heat and gases, sudden pressure relay 80MRST11 will initiate a signal to unit lockout relay 86SU, which trips 230kV power circuit breaker 212 isolating the plant from startup power.

Each Diablo Canyon Power Plant unit has three emergency diesel generators (EDGs) [EK][DG] which supply power to the 4.16kV vital AC buses [EA][BU] whenever power is either unavailable, or voltage degrades below the point at which required loads could become inoperable. EDGs automatically start on a safety injection signal, degraded or loss of voltage on the associated vital bus, or undervoltage on the 230kV startup power system.

During normal operation, the 4.16kV vital buses are powered from the auxiliary power system. The 230kV system provides an immediately available source of offsite power to the 4.16kV system. The 230kV system provides power to the SUTs [EA][XFMR] 1-1 and 2-1 (230kV to 12kV), which feeds the SUT 1-2 and 2-2 (12 kV to 4,160V), respectively. SUTs 1-2 and 2-2 then supply power to each vital bus.

TEXT

B. Event Description

On November 19, 2005, maintenance relay technicians were completing final relay testing and functional tests to support SUT 1-1 return to service. One of the tests included the functional test of relay 80MRST11, the sudden pressure relay for SUT 1-1.

The work order directed checking LTC relay 80MRST11 in accordance with the vendor manual. The function test consisted of pushing a test button to verify contacts change state. The task was completed recently on a similar relay in Unit 2 without incident.

At 15:51 PST, the technician proceeded with the functional test of the relay and actuated relay 80MRST11, causing 230kV breaker 212 to trip open, and deenergizing 12kV site power. The three Unit 2 EDGs started on the loss of 230kV as designed.

At 16:15 PST, after determining the immediate cause for the loss of 230kV power, operators restored 230kV power and shutdown the EDGs.

C. Status of Inoperable Structures, Systems, or Components that Contributed to the Event

No inoperable plant structures, systems or components were involved in, or contributed to, this event. The startup bus protection and EDG starting scheme operated as designed.

D. Other Systems or Secondary Functions Affected

None. Both Unit 1 and 2 were otherwise unaffected with power continuing to be supplied from the auxiliary transformers. The site lost the 12kV underground loop which powers administrative loads and offices.

E. Method of Discovery

The event was self-revealing to licensed control room operators by annunciators indicating the startup bus degraded voltage condition and the Unit 2 EDG auto-starts.

F. Operator Actions

On November 19, 2005, at 16:15 PST, operators cut out the sudden pressure relay on SUT 1-1, reset SUT 1-1 sudden pressure relay

(device 63YUT11) reset relay 86SU (SUT 1-1 and 2-1 lockout), and restored 230kV offsite power. At 1721 PST, operators made a nonemergency event notification (EN 42157) in accordance with 10 CFR 50.72(b)(3)(iv)(A).

G. Safety System Responses

Prior to this event, Unit 1 had startup power cleared for planned maintenance. All three vital buses were powered from auxiliary power with their associated EDGs in standby. Following the event, auxiliary power remained as the Unit 1 power source and the EDGs remained in standby.

Prior to this event, Unit 2 was in Mode 1 (Power Operation) at full power. The vital buses were powered from auxiliary power and EDGs were in standby. With the loss of 230kV startup power, the emergency EDGs received a start signal and started as designed.

III. Cause of the Problem

A. Immediate Cause

The functional test of the sudden pressure relay on SUT 1-1 caused 230kV breaker 212 to trip, causing a loss of startup power for both units. The relay trip cut-outs were not used to prevent breaker 212 from opening.

B. Root Cause

This was a human performance error. Utility personnel failed to review applicable drawings and take appropriate actions prior to relay actuation, which resulted in an unexpected loss of 230kV power. The technician was aware of the requirement to review drawings prior to testing and was aware that the Unit 1 startup system was under an active clearance. The technician had walked down the clearance but failed to recognize the clearance was not adequate for the scope of the test. It was assumed that a print review was not necessary since a previous functional test of a similar relay in Unit 2 during the last outage had no adverse consequences.

During the prejob brief, the supervisor did not specifically direct the technician to review all prints prior to performing the functional test. The supervisor was aware that it was a standing expectation, based upon the training received in “Basic Relay” class, that drawings always be reviewed

and the characteristics of the relay understood prior to any relay actuation. Interviews with various technicians following this event confirmed the understanding of this expectation.

C. Contributory Cause

Inconsistent relay work package quality:

- Work order clearance notes did not include a request for opening relay Trip Cut-Outs (TCOs) as part of the clearance, leaving it up to the experience of the technician to determine what prerequisites were required. The work orders were written with the "experienced" technician in mind and did not include prerequisites for isolating equipment.

Procedural guidance:

- DCPP procedure MP E-60.10, Generic Function Test, was not referenced in the work order; this procedure requires a circuit isolation plan.
- No specific functional testing procedural guidance exists for relay 80MRST11.

IV. Assessment of Safety Consequences

There were no significant safety consequences as a result of this event. Unit 1 startup was cleared prior to the event and equipment necessary for decay heat removal was powered by auxiliary power. Unit 2 remained at full power and all vital buses remained powered by auxiliary power.

Therefore, the event is not considered risk significant and it did not adversely affect the health and safety of the public.

V. Corrective Actions

A. Immediate Corrective Actions

1. Utilized the Human Performance Investigation Tool with individuals involved to determine the root cause of this event.

B. Corrective Actions to Prevent Recurrence

1. Clarify testing standards by presenting tailboard or section meeting

TEXT

discussions and have supervisors reinforce clearance and drawings reviews and implementation of circuit isolation plans. Develop and schedule a relay refresher drawing class.

2. Review and clarify recurring task work orders associated with relay testing:

   - Emphasize use of the circuit isolation plan
   - Perform a focused review of common systems
   - Enhance instructions or MP E-60.10 references

3. Expand the MP E-60.10 “Generic Function Test” instructions.

4. Clarify the circuit isolation plan process.

5. Develop functional testing guidance for relay 80MRST11.

VI. Additional Information

A. Failed Components

None

B. Previous Similar Events

LER 1-2004-001, “Unplanned Valid EDG Auto-Start During Phase Sequence Check Due to Personnel Error in Confirguring Test Equipment Setup,” reported a similar event. Corrective action required supplemental (nonsite permanent) personnel to have a prejob brief in human performance error reduction techniques prior to work on sensitive plant equipment.

OUTGOING CORRESPONDENCE SCREEN
(Remove prior to NRC submittal)

Document: PG&E Letter DCL-06-009

Subject: Unplanned Emergency Diesel Generator Auto-start During Testing Due to Personnel Error in Relay Testing

File Location S:\RS\RA\LER\2005\UNIT 2 DG START\DCL06009.DOC

FSAR Update Review
Utilizing the guidance in XI3.ID2, does the FSAR Update need to be revised? Yes ☐ No ☒ *If "Yes", submit an FSAR Update Change Request in accordance with XI3.ID2 (or if this is an LAR, process in accordance with WG-9)*

Commitment #A1

Statement of Commitment: Utilize the Human Performance Investigation Tool with individuals involved with this event.

Clarification.

	AR or NCR	*AE or ACT*
Tracking Document:	A0652421	AE 03
Assigned To:	*NAME* SPP2	*ORGANIZATION CODE* PGME ADM/
Commitment Type:	*FIRM OR TARGET* Target	*DUE DATE:* 12/30/2005
Outage Commitment?	*YES OR NO* No	*IF YES, WHICH? (E.G., 2R9, 1R10, ETC.)*
PCD Commitment?	*YES OR NO* No	*IF YES, LIST THE IMPLEMENTING DOCUMENTS (IF KNOWN)*
Duplicate of New NCR Commitment in PCD?	*YES OR NO*	*IF YES, LIST PCD NUMBER (e.g., T35905, etc.)*
Old PCD Commitment being changed?	*YES OR NO*	*IF YES, LIST PCD NUMBER, AND CLARIFY TO CLERICAL HOW COMMITMENT TO BE REVISED*

Commitment #B1

Statement of Commitment: Clarify "Testing Standards" by presenting tailboard or section meeting discussions and have supervisors reinforce clearance and drawings reviews and implementation of circuit isolation plans. Develop and schedule a relay refresher drawing class.

Clarification.

	AR or NCR	*AE or ACT*
Tracking Document:	A0652421	AE 04 and AE 13
Assigned To:	*NAME* MJF3 and SPP2	*ORGANIZATION CODE* PGME and PAEM
Commitment Type:	*FIRM OR TARGET* Target	*DUE DATE:* 06/01/2006 and 12/01/2006
Outage Commitment?	*YES OR NO* No	*IF YES, WHICH? (E.G., 2R9, 1R10, ETC.)*
PCD Commitment?	*YES OR NO* No	*IF YES, LIST THE IMPLEMENTING DOCUMENTS (IF KNOWN)*
Duplicate of New NCR Commitment in PCD?	*YES OR NO* No	*IF YES, LIST PCD NUMBER (e .g., T35905, etc.)*
Old PCD Commitment being changed?	*YES OR NO* No	*IF YES, LIST PCD NUMBER, AND CLARIFY TO CLERICAL HOW COMMITMENT TO BE REVISED*

Commitment #B2

Statement of Commitment: Review and clarify recurring task work orders associated with relay testing: Emphasize use of the circuit isolation plan, Perform a focused review of common systems, Enhance instructions or MP E-60.10 references

Clarification.

Tracking Document:	*AR or NCR* A0652421	*AE or ACT* AE 05, 06, 07, 08
Assigned To:	*NAME* WDU1 and MAZ1	*ORGANIZATION CODE* PGST and PSTT
Commitment Type:	*FIRM OR TARGET* Target	*DUE DATE:* 12/01/2006
Outage Commitment?	*YES OR NO* No	*IF YES, WHICH? (E.G., 2R9, 1R10, ETC.)*
PCD Commitment?	*YES OR NO* Yes	*IF YES, LIST THE IMPLEMENTING DOCUMENTS (IF KNOWN)* List to be provided
Duplicate of New NCR Commitment in PCD?	*YES OR NO* No	*IF YES, LIST PCD NUMBER (e.g., T35905, etc.)*
Old PCD Commitment being changed?	*YES OR NO* No	*IF YES, LIST PCD NUMBER, AND CLARIFY TO CLERICAL HOW COMMITMENT TO BE REVISED*

Commitment #B3

Statement of Commitment: Expand the MP E-60.10 “Generic Function Test” instructions.

Clarification.

Tracking Document:	*AR or NCR* A0652421	*AE or ACT* AE 11
Assigned To:	*NAME* MAZ1	*ORGANIZATION CODE* PSTT
Commitment Type:	*FIRM OR TARGET* Target	*DUE DATE:* 12/01/2006
Outage Commitment?	*YES OR NO* No	*IF YES, WHICH? (E.G., 2R9, 1R10, ETC.)*
PCD Commitment?	*YES OR NO* Yes	*IF YES, LIST THE IMPLEMENTING DOCUMENTS (IF KNOWN)* MP E-60.10
Duplicate of New NCR Commitment in PCD?	*YES OR NO* No	*IF YES, LIST PCD NUMBER (e.g., T35905, etc.)*
Old PCD Commitment being changed?	*YES OR NO* No	*IF YES, LIST PCD NUMBER, AND CLARIFY TO CLERICAL HOW COMMITMENT TO BE REVISED*

Commitment #B4

Statement of Commitment: Clarify the circuit isolation plan process.

Clarification.

Tracking Document:	*AR or NCR* A0652421	*AE or ACT* AE 12
Assigned To:	*NAME* CLCP	*ORGANIZATION CODE* PSTT / PSTA
Commitment Type:	*FIRM OR TARGET* Target	*DUE DATE:* 12/01/2006
Outage Commitment?	*YES OR NO* No	*IF YES, WHICH? (E.G., 2R9, 1R10, ETC.)*
PCD Commitment?	*YES OR NO* Yes	*IF YES, LIST THE IMPLEMENTING DOCUMENTS (IF KNOWN)* AD7.DC8
Duplicate of New NCR Commitment in PCD?	*YES OR NO* No	*IF YES, LIST PCD NUMBER (e.g., T35905, etc.)*
Old PCD Commitment being changed?	*YES OR NO* No	*IF YES, LIST PCD NUMBER, AND CLARIFY TO CLERICAL HOW COMMITMENT TO BE REVISED*

Commitment #B5

Statement of Commitment: Develop functional testing guidance for 80MRST11

Clarification.

Tracking Document:	*AR or NCR* A0652421	*AE or ACT* AE 10
Assigned To:	*NAME* MAZ1	*ORGANIZATION CODE* PSTT / PSTM
Commitment Type:	*FIRM OR TARGET* Target	*DUE DATE:* 12/01/2006
Outage Commitment?	*YES OR NO* No	*IF YES, WHICH? (E.G., 2R9, 1R10, ETC.)*
PCD Commitment?	*YES OR NO* Yes	*IF YES, LIST THE IMPLEMENTING DOCUMENTS (IF KNOWN)* TBD
Duplicate of New NCR Commitment in PCD?	*YES OR NO* No	*IF YES, LIST PCD NUMBER (e.g., T35905, etc.)*
Old PCD Commitment being changed?	*YES OR NO* No	*IF YES, LIST PCD NUMBER, AND CLARIFY TO CLERICAL HOW COMMITMENT TO BE REVISED*

Work Order - R0238079-01
Work Order - R0218691-02
Maintenance Procedure - MP E-60.10
Schematic Drawing # 437619

A0652421 If applicable for LER tracking or other specific ARs that are of primary interest to the LER.