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 4

TITLE (4) TURBINE TRIP/REACTOR TRIP CAUSED BY GENERATOR VOLTAGE REGULATOR TRANSIENT

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 5 0 0 0
0 2	2 2	8 6	8 6	— 0 0 5	— 0 0	0 3	2 4	8 6		0 5 0 0 0

OPERATING MODE (9)	1
POWER LEVEL (10)	0 9 5

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

☐ 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)	☐ 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
WILLIAM J. KELLY, 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	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

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

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

At 1803 PST, February 22, 1986, with Unit 2 in Mode 1 (Power Operation) at approximately 95 percent power, a main turbine and subsequent reactor trip occurred due to a generator loss of electrical field relay actuation. The generator loss of electrical field relay was actuated by a transient on the main generator voltage regulator and resulting voltage fluctuations on the main generator. Operators followed the appropriate emergency procedures and the unit was stabilized in Mode 3 (Hot Standby) at 1840 PST, February 22, 1986. This event was caused by incorrect polarity on the outpout of the current transformer to the main generator voltage regulator Minimum Excitation Limiter (MEL). The turbine generator and reactor protection systems responded as designed and did not result in any adverse safety consequences or implications.

The MEL leads were reversed and the voltage regulator was satisfactorily tested. In addition, the Unit 1 current transformer polarity was checked and no problem was found.

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I. Initial Conditions

Unit 2 was in Mode 1 (Power Operation) at approximately 95 percent power.

II. Description of Event

A. Event

At 1803 PST, February 22, 1986, a main turbine and subsequent reactor trip occurred due to a generator loss of electrical field relay actuation. The generator loss of electrical field relay was actuated by a transient on the main generator voltage regulator (TL)(RG) and resulting voltage fluctuations on the main generator.

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

None

C. Dates and approximate times for major occurrences:

1. February 22, 1986, 1803 PST: Event date

2. February 22, 1986, 1840 PST: Stable conditions achieved

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:

Operators observed the transient on the main generator voltage regulator and turned the voltage regulator off. Subsequent to the main turbine and reactor trips, operators followed appropriate emergency procedures and placed the unit in a stable condition.

G. Safety system responses:

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

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

III. Cause of Event

A. Immediate cause:

The main turbine and subsequent reactor trip occurred due to a generator loss of electrical field relay actuation. The generator loss of electrical field relay was actuated by a transient in the main generator voltage regulator and resulting voltage fluctuations on the main generator.

B. Root cause:

The main generator voltage regulator Minimum Excitation Limiter (MEL) printed circuit board current tranformer leads were reversed, resulting in the MEL providing a "boost" signal to the voltage regulator when the main generator was in an overexcited condition. Failure of the voltage regulator to control the main generator field prompted operators to remove the voltage regulator from service. The main generator base adjuster was at a lower setpoint and the base adjuster follower deadband was too great, which caused the main generator to drop voltage, resulting in actuation of the generator loss of electrical field relay.

The MEL leads were installed in accordance with plant drawings which specified installation of the current transformer with polarity in accordance with PGandE's standard practice. However, this configuration conflicted with that used by the turbine generator manufacturer (Westinghouse). Either configuration can be used if used consistently throughout the main generator control system.

IV. Analysis of Event

Actuation of the reactor protection system resulted in the unit being placed in a safe shutdown condition. No adverse safety consequences or implications resulted from this event.

V. Corrective Actions

The MEL leads were reversed and the voltage regulator was satisfactorily tested. The main generator field forcing alarm has been lowered to provide operators sufficient warning when an abnormal condition exists in the generator excitation field. The base adjuster follower dead band has been recalibrated to decrease the difference between the base adjuster and voltage adjuster. Unit 1 was checked and no problem was found.

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

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 24, 1986

PGandE Letter No.: DCL-86-076

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 2-86-005-00
Turbine Trip/Reactor Trip Caused by
Generator Voltage Regulator Transient

Gentlemen:

Pursuant to 10 CFR 50.73(a)(2)(iv), PGandE is submitting the enclosed Licensee Event Report concerning a main generator voltage regulator transient resulting in a turbine generator and reactor trip.

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

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