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 1	0 5 0 0 0 2 7 5	1 OF 0 6

TITLE (4) REACTOR TRIP AND TWO SAFETY INJECTIONS DUE TO A FAILED STEAM DUMP CONTROLLER

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	1 4	8 6	8 6	— 0 0 4 —	0 0	0 4	1 4	8 6		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9): 1

POWER LEVEL (10): 0 9 8

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)	X 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)	X 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)	SPECIAL REPORT
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	
	AREA CODE	
STEPHEN D. WILSON, REGULATORY COMPLIANCE ENGINEER	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
B	J I	I M O D	H 0 2 1	Y					

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 March 14, 1986, at 1428 PST, while the unit was in Mode 1 (Power Operation) at 98 percent power, a high steam flow and low steamline pressure safety injection with a subsequent reactor trip occurred. The high steam flow transient resulted from all condenser steam dump valves opening fully. The steam dump valves shut when the main turbine tripped.

The appropriate emergency procedures were followed and the unit was stabilized in Mode 3 (Hot Standby) at 1500 PST. This was the eighth emergency core cooling system (ECCS) actuation cycle that has resulted in the discharge of water into the reactor coolant system.

On March 14, 1986 at 1556 PST, while the unit was in Mode 3 (Hot Standby) and while investigation of the earlier safety injection was ongoing, a high steam flow and low-low Tavg safety injection occurred. The high steam flow transient was caused by group I condenser steam dump valves opening momentarily.

The appropriate emergency procedures were followed and the unit was stabilized in Mode 3 (Hot Standby) at 1559 PST. This was the ninth ECCS actuation cycle that has resulted in the discharge of water into the reactor coolant system.

The cause of the unintentional operation of the condenser steam dump valves for both events was a failed control module in the steam dump control system. The failed module was replaced and tested satisfactorily.

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I. Plant Conditions

Unit 1 was in Mode 1 (Power Operation) at 98 percent power.

II. Description of Event

A. Event

At 1428 PST, March 14, 1986, while the unit was in Mode 1 (Power Operation) at 98 percent power, a safety injection and subsequent reactor trip (AB)(RCT) occurred. The safety injection was the result of high steam flow and low steamline pressure transients occurring from a malfunction in the steam dump control system. This was the eighth emergency core cooling system (ECCS) actuation cycle that has resulted in the discharge of water into the reactor coolant system.

On March 14, 1986, at 1407 PST, plant personnel suspended Surveillance Test Procedure (STP) R-7B, "Determination of Moderator Temperature Coefficient At Power" because of recording instrument problems. STP R-7B had required the main turbine control to be in manual operation. While operators were returning turbine control to automatic valve operation, a net change in turbine load of approximately 100 megawatts occurred. The turbine load change has been attributed to the impulse feedback being selected during turbine governor valve mode change. The load change was enough to actuate control interlock C-7A (Turbine Load Rejection Interlock). Control interlock C-7A is one of the signals needed to permit the opening of the steam dumps during a load rejection. TC-500A, steam dump turbine load rejection temperature controller module, had malfunctioned and was in a failed high condition. When control interlock C-7A was actuated, all 12 condenser steam dump valves opened in response to the 100% demand signal generated as a result of TC-500A failing. The greatly increased steam flow resulted in a high steam flow and low steamline pressure safety injection. The safety injection resulted in the reactor trip and subsequent turbine trip. The steam dumps shut after the turbine tripped since steam dump control from TC-500A is blocked by this turbine trip.

An unusual event was declared at 1428 PST and terminated at 1500 PST. The appropriate emergency procedures were followed and the unit was stabilized in Mode 3 (Hot Standby) at 1500 PST. In accordance with the emergency procedure, the safety injection was reset and the reactor trip breakers were closed at 1519 PST.

With the unit in Mode 3 (Hot Standby) and while plant personnel were still investigating the first safety injection, a second safety injection occurred at 1556 PST, March 14, 1986. The reactor trip breakers opened in response to the second safety injection signal. This was the ninth ECCS actuation cycle that has resulted in the discharge of water into the reactor coolant system. This safety injection occurred when control room operators reset control interlock C-7A. The main turbine had been "latched" prior to the second safety injection. This action placed the failed TC-500A module back into the circuitry required for opening the steam dump condenser valves. When the operator passed through the Tavg mode on the steam dump mode selector switch while resetting control interlock C-7A, the group I condenser steam dump valves opened momentarily. All other groups of steam dump valves were blocked from opening because Tavg was less than the low-low Tavg interlock setpoint. The resulting high steam flow caused a high steamflow and low-low Tavg safety injection. The steam dump valves shut when the safety injection caused a turbine trip that removed TC-500A from the steam dump control logic.

An unusual event for the second safety injection was declared at 1556 PST, March 14, 1986, and terminated at 1559 PST. The appropriate emergency procedures were followed and the unit was stabilized in Mode 3 at 1559 PST.

Emergency diesel generators 1-1, 1-2, and 1-3 started on both safety injection events but did not load. A phase "A" containment isolation occurred as a result of both safety injections.

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

None

C. Dates and approximate times for major occurrences.

1. March 14, 1986 at 1428 PST: First Safety injection and reactor trip occurs.

2. March 14, 1986 at 1500 PST: Stable conditions achieved.

3. March 14, 1986 at 1556 PST: Second safety injection occurs.

4. March 14, 1986 at 1559 PST: Stable conditions achieved.

D. Other system or secondary functions affected:

None

0819S/0043K

E. Method of Discovery:

The safety injections and reactor trip were readily apparent from control room alarms and indications. Failure of the TC-500A control module was not identified prior to the second actuation of the condenser steam dumps. When the second actuation of the steam dumps occurred, the suspect component was quickly identified by the nature of the event.

F. Operator Actions:

The operators followed the appropriate emergency procedures and placed the unit in a stable condition following both safety injection events.

G. Safety system responses:

On March 14, 1986, at 1428 PST:

1. The Emergency Core Cooling System (ECCS) equipment started in response to a safety injection signal.

2. The reactor trip breakers opened.

3. The control rod drive mechanism allowed the control rods to drop into the reactor.

4. The turbine tripped.

5. A phase "A" containment isolation occurred.

6. Emergency diesel generators 1-1, 1-2, and 1-3 started but did not load.

On March 14, 1986, at 1556 PST:

1. The Emergency Core Cooling System (ECCS) equipment started in response to a safety injection signal.

2. The reactor trip breakers opened.

3. A phase "A" containment isolation occurred.

4. Emergency diesel generators 1-1, 1-2 and 1-3 started but did not load.

0819S/0043K

III. Cause of Event

A. Immediate Cause:

On March 14, 1986, at 1428 PST, a safety injection and subsequent reactor trip was caused by a high steam flow and low steamline pressure transients when all condenser steam dumps opened.

On March 14, 1986, at 1556 PST, a safety injection was caused by a high steam flow and low-low Tavg condition caused by group I condenser steam dump valves opening fully.

B. Root Cause:

The TC-500A control module was in a failed high condition for both safety injection events. This failed component caused the condenser steam dumps demand signal to be for 100% open. However, the condenser steam dumps would not open until control interlock C-7A had been satisfied indicating a turbine load rejection condition. When the unit experienced a 100 Megawatt load swing as a result of changing the mode of main turbine control, control interlock C-7A was satisfied and all condenser steam dumps opened. A high steam flow and low steamline pressure safety injection resulted from the steam dumps opening. When the turbine tripped, as a result of a reactor trip, the failed module was no longer in the control circuitry for the steam dump control system and all condenser steam dump valves shut.

The second safety injection occurred when conditions that caused the first safety injection were duplicated. When the main turbine was "latched", the control circuitry for the steam dumps was set up so that the failed TC-500A control module would again be controlling steam dump valve position if the steam dump control selector switch was placed in the Tavg mode. When the operator reset the C-7A control interlock by taking the steam dump control mode selector to reset, he passed through the Tavg mode selection. The group I condenser steam dump valves came open causing a high steam flow and low-low Tavg safety injection. When the turbine tripped, the TC-500A module was removed from the steam dump control logic and the group I condenser steam dump valves shut. All other groups of steam dump valves were blocked from opening because Tavg was less than the low-low Tavg interlock setpoint.

IV. Analysis of Event

The inadvertent opening of all condenser steam dumps at power and shutdown is not specifically addressed in the FSAR Update (September 1985, Revision 1). A rupture of a main steam line, which is a more severe event, is analyzed in Section 15.4.2. The analysis has found that in all cases, assuming the most adverse initial operating conditions with respect to the margin to departure from nucleate boiling (DNB), the departure from nucleate boiling ratio (DNBR) is never below 1.30. Therefore, no core safety limit was violated. The possibility of a complete main steamline depressurization due to steam dump valves opening is unlikely because of permissive P-12. P-12 automatically blocks closed all steam dump valves at the low-low Tavg setpoint. An operator bypass is available for operation of group I steam dumps below the low-low Tavg setpoint. Since the reactor protection system performed as designed, no adverse safety consequences or implications resulted from these events.

V. Corrective Actions

The TC-500A control module was replaced and the circuitry was tested satisfactorily. The control module failure was determined to be an isolated electronic failure. The event was reviewed with all the concerned personnel in the Operations Department. Operating Procedures L-2, "Hot Standby to Minimum Load", and L-4, "Normal Operation At Power", will be revised to include precautions on changing turbine control modes. The Operator Training Department will include precautions on changing turbine control modes in training material presented to control room operators.

VI. Additional Information

A. Failed components:

Control Module No. - TC-500A

Manufacturer - Hagan Corporation

B. Previous LERs on similar events:

None

0819S/0043K

PACIFIC GAS AND ELECTRIC COMPANY

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JAMES D. SHIFFER
VICE PRESIDENT
NUCLEAR POWER GENERATION

April 14, 1986

PGandE Letter No.: DCL-86-103

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

Re: Docket No. 50-275, OL-DPR-80
Diablo Canyon Unit 1
Licensee Event Report 1-86-004-00
Reactor Trip and Two Safety Injections Due To A Failed Steam Dump Controller

Gentlemen:

Pursuant to 10 CFR 50.73(a)(2)(iv) and as required by Technical Specification 6.9.2 and Action Statement b. of Technical Specification 3.5.2, PGandE is submitting the enclosed Licensee Event Report/Special Report on a unit safety injection and reactor trip followed by a second safety injection.

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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