



**Pacific Gas and
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PG&E Letter DCL-00-136

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 2-2000-003-00

Technical Specification 3.6.5 Not Met Due to the Unanticipated Failure Mode of the
Containment Average Air Temperature Indicator

Dear Commissioners and Staff:

PG&E is submitting the enclosed licensee event report regarding Technical Specification 3.6.5, "Containment Air Temperature," not being met due to the unanticipated failure mode of the temperature indicator which resulted in the surveillance not being met for nearly 6 months.

This event was not considered risk significant and did not adversely affect the health and safety of the public.

Sincerely,

David H. Oatley

cc: Ellis W. Merschoff
David L. Proulx
Lakshminaras Raghavan
Diablo Distribution
INPO

Enclosure

LMP/2246/Q0012204

IE22

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Diablo Canyon Unit 2										DOCKET NUMBER (2) 0 5 0 0 0 3 2 3						PAGE (3) 1 OF 7			
TITLE (4) Technical Specification 3.6.5 Not Met Due to the Unanticipated Failure Mode of the Containment Average Air Temperature Indicator																			
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			
04	06	2000	2000	-	0	0	3	-	0	0	10	26	2000						
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11)																	
1		X 10 CFR 50.73(A)(2)(i)(B)																	
POWER LEVEL (10)		OTHER (SPECIFY IN ABSTRACT BELOW AND IN TEXT, NRC FORM 366A)																	
1		0		0															
LICENSEE CONTACT FOR THIS LER (12)																			
Roger Russell - Senior Regulatory Services Engineer														TELEPHONE NUMBER					
														AREA CODE		805		545-4327	
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		
D	I	K	T	I	M	0	5	2	N										
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED				MON DAY YR					
[] YES (If yes, complete EXPECTED SUBMISSION DATE)										[X] NO				SUBMISSION DATE (15)					
ABSTRACT (Limit to 1400 spaces. i.e., approximately 15 single-spaced typewritten lines.) (16)																			
On April 6, 2000, with Unit 2 in Mode 1 (Power Operation) at 100 percent power, the Limiting Condition for Operation of Technical Specification (TS) 3.6.5, "Containment Air Temperature," was not met when the containment average air temperature indicator (TI-26) failed as-is and went undetected during subsequent daily surveillances. Consequently, the containment average air temperature had not been verified. On September 26, 2000, a utility licensed operator, while performing the daily surveillance test procedure (STP), determined TI-26 was inoperable when the digital temperature indicator did not recalculate when different temperature elements were selected. The cause of the TS violation was an unanticipated failure mode of TI-26. On September 26, 2000, at 2207 PDT, operators declared the TI-26 inoperable, entered TS surveillance requirement 3.0.3 and calculated the average containment temperature directly from the functioning temperature elements. On September 27, 2000, at 1749 PDT, operators satisfied the surveillance requirement by confirming the containment temperature was less than the 120 degrees Fahrenheit. On September 28, 2000, after TI-26 was replaced, operators declared it operable. Corrective actions to prevent recurrence include revising STP I-1B to verify TI-26 is functioning while verifying the indicated temperature is within limits.																			

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TEXT

I. Plant Conditions

Unit 2 was in Mode 1 (Power Operation), Mode 2 (Startup), and Mode 3 (Hot Shutdown) during the time period that the condition existed.

II. Description of Problem

A. Background

Technical Specification (TS) 3.6.5, "Containment Air Temperature," requires the average air temperature inside containment to be less than or equal to 120 degrees Fahrenheit (F) during Modes 1, 2, 3, and 4. The Limiting Condition for Operation (LCO) required actions allow 8 hours to bring the containment average air temperature within limits. If still outside the limits, the unit is required to be in Mode 3 within 6 hours and Mode 5 within 36 hours. Surveillance Requirement (SR) 3.6.5.1 requires verification every 24 hours, that the containment average air temperature limit is met.

Surveillance Test Procedure (STP) I-1B, "Routine Daily Checks Required By Licenses," is performed every 24 hours and satisfies TS SR 3.6.5.1 by verifying containment average air temperature [IK, IM] is within the TS limit. STP I-1B directs operators to record the average containment air temperature indicated by TI-26 and verifying it is less than or equal to 116 degrees F.

TS SR 3.0.3 allows up to 24 hours to perform a missed surveillance before entering the applicable LCO required actions.

TI-26 calculates an average temperature and displays the result digitally to the nearest degree F. Inputs to TI-26 may be selected from up to eight temperature elements (TEs) located throughout containment. STP I-1B directs the operator to select four specific "normal" representative TEs for averaging. The other four TEs are alternates. TI-26 is design class II, performance monitoring equipment, and is located at the 100 foot elevation of the Auxiliary Building. TI-26 provides an input to the following:

- Temperature recorder (TR-26) [IM]. This analog chart recorder is scaled from 0 to 400 degrees F and located in the control room.
- Plant process computer (PPC) [ID] which provides a temperature alarm (TA) [IB] in the control room if indicated temperature exceeds 120 degrees F.

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TEXT

- Emergency Response Facility Display System (ERFDS).

Calibration of TI-26 is performed every two years using Maintenance Procedure MP I-23-T85, "Containment Temperature Channels TE-85 thru TE-92 Calibration," and was last performed October 15, 1999, with no problems noted.

Other containment air temperature transmitters (TTs) that are independent of TI-26 include:

- Control Rod Drive Mechanism (CRDM) [AA] fan inlet TTs (4), which provide inputs to the PPC and alarm in the control room if temperature exceeds 145 degrees F.
- Vessel shield wall [VC] TTs (4), which provide inputs to the PPC and alarm in the control room if temperature exceeds 130 degrees F.
- Post Accident Monitoring (PAM) [IP] TTs (2) provide control room indication.

B. Event Description

On April 6, 2000, TI-26 failed "as-is" indicating a containment average air temperature of 92 degrees F. This prevented the associated recorder, TR-26, and control room alarm from performing their functions.

On April 6, 2000, operators used TI-26 to perform SR 3.6.5.1. Since TI-26 was inoperable, the SR was not valid and the appropriate condition statement was required to be entered. However, since operators were not aware TI-26 had failed, TI-26 was not declared inoperable, and containment average air temperature was not verified using alternate means. Therefore, the required actions for TS 3.6.5 were not met.

On September 26, 2000, a licensed operator, while performing STP I-1B, demonstrated to a trainee how alternate TEs can be selected on TI-26. The operator noted that TI-26 did not respond when alternate TEs were selected. On September 26, 2000 at 2207 PDT, TI-26 was declared inoperable and SR 3.0.3 was entered to perform the required containment air temperature surveillance.

On September 27, 2000, at 1749 PDT, containment average air temperature was verified to be less than 116 degrees F, satisfying

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TEXT

SR 3.6.5.1. Based on a review of containment temperature data from the PPC, operators determined TI-26 failed on April 6, 2000.

On September 28, 2000, after maintenance personnel replaced and calibrated TI-26, operators declared it operable. The containment average air temperature was 97 degrees F.

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

None

D. Other Systems or Secondary Functions Affected

The failure of TI-26 resulted in a loss of the following associated functions:

- The temperature recorder in the control room, TR-26, displayed a "flat-line" at 92 degrees F.
- The associated alarm at 120 degrees F would not function due to the constant input at 92 degrees F.
- The ERFDS would continue to display 92 degrees F.

E. Method of Discovery

The licensed reactor operator performing the daily STP I-1B was accompanied by an operator-in-training. The licensed operator noted a recent increase in Unit 1 containment average air temperature which he attributed to an increase in ocean temperature [BS]. He became suspicious when he saw no similar temperature increase in Unit 2 TI-26. In order to resolve his suspicions and to demonstrate the capability of TI-26 to the trainee, he selected alternate TEs, expecting to see the calculated average temperature vary. When he observed no change in the indicated temperature, even when no TE was selected, he concluded TI-26 had failed, and immediately reported it to the control room.

F. Operator Actions

Operators entered SR 3.0.3 and completed SR 3.6.5.1 within 24 hours by having engineers collect the individual containment TE readings and use them to calculate a containment average air temperature.

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TEXT

G. Safety System Responses

None

III. Cause of the Problem

A. Immediate Cause

The power supply to TI-26 failed, causing it to indicate the last temperature reading prior to the power supply failure.

B. Root Cause

The root cause of the TS violation was the unanticipated failure mode of TI-26 to "fail as-is." When TI-26 was replaced with a new design in 1988, engineering did not consider an "as-is" failure. A failed power supply was assumed to cause the indicator to go blank. A failed TE input would be either high or low resulting in a very questionable indication of average temperature. Therefore, no routine surveillance was specified to look for a "fail as-is" type of failure.

IV. Analysis of the Event

Containment average air temperature is an initial condition used in the design basis accident (DBA) analyses that established the containment environmental qualification operating envelope for both pressure and temperature. The limit for containment average air temperature ensures that operation is maintained within the assumptions used in the DBA analyses for containment as described in Section 6.2 of the Final Safety Analysis Report (FSAR).

The limiting DBAs considered relative to containment operability are the loss of coolant accident (LOCA) and steam line break (SLB). The DBA LOCA and SLB are analyzed using computer codes designed to predict the resultant containment pressure and temperature transients. The failure to close of one main steam isolation valve while at 70 percent power is the worst case single active failure for the SLB, which results in the highest containment air temperature. The initial containment average air temperature assumed in the design basis analyses in FSAR Section 6.2 is 120 degrees F.

The containment pressure transient is sensitive to the initial air mass in containment and, therefore, to the initial containment air temperature. The

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TEXT

temperature limit is used in this analysis to ensure that in the event of an accident the maximum containment internal pressure will not be exceeded.

During a DBA, with an initial containment average air temperature less than or equal to the LCO temperature limit, the resultant accident temperature profile of the containment structural temperature will be maintained below the containment design temperature and that required safety related equipment within containment will continue to perform its function. As a result, the ability of containment and safety related equipment within containment to perform their design function is assured.

Verifying that containment average air temperature is within the LCO limit ensures that containment operation remains within the limit assumed for the containment analyses. In order to determine the containment average air temperature, an arithmetic average is calculated using four temperature measurements from representative elevations and quadrants of containment.

During the period TI-26 was inoperable, three containment fan cooler units remained operating in high speed, as is the standard practice. No significant operational changes occurred in Unit 2 that would have significantly increased the containment air temperature. Also, archived containment air temperature data from eight TTs (four CRDM fans and four vessel shield wall TTs) was extracted from the PPC and reviewed. The data showed no temperature anomalies during the period TI-26 was inoperable. Unit 2 containment average air temperature is typically less than 100 degrees F, or more than 20 degrees F below the TS limit. Therefore, while TI-26 was inoperable, all evidence indicates that the actual containment average air temperature remained below the TS limit.

Also, containment air temperature indication remained operable on the PAM temperature indicators. While not an average temperature, these indicators remained available to the operators and would provide a representative containment air temperature.

In addition, alarms associated with other containment air TTs would have alerted operators to a significant temperature increase in containment.

While the TS SR was not met for nearly 6 months, based on the above analysis, no TS limit was violated, and operators would have been alerted to a significant temperature increase. Therefore, the event is considered:

- Not a Safety System Functional Failure;
- A "green" safety significance, based on the use of the NRC's Significance

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TEXT

Determination Process in accordance with NRC Inspection Manual Chapter 0609;

- Not risk significant, and;
- To have no adverse effect on the health and safety of the public.

V. Corrective Actions

A. Immediate Corrective Actions

TI-26 was replaced, calibrated, and returned to service.

B. Corrective Actions to Prevent Recurrence

To ensure TI-26 has not failed "as-is," STP I-1B will be revised to direct operators to observe TI-26 actively calculate containment average air temperature. This may be accomplished by recording the containment average air temperature as calculated by TI-26, both from the normal set of TEs and from the alternate set of TEs.

VI. Additional Information

A. Failed Components

TI-26 is manufactured by Manco manufacturing company, model number "OPTO 22."

B. Previous Similar Events

None