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 6

TITLE (4) COMPONENT COOLING WATER SYSTEM POTENTIALLY OUTSIDE DESIGN BASIS DUE TO NONCONSERVATISMS IN THE DESIGN-BASIS ANALYSIS

EVENT DATE (6)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MON	DAY	YR	YR	SEQUENTIAL NUMBER	REVISION NUMBER	MON	DAY	YR	FACILITY NAMES	DOCKET NUMBER (S)
01	13	93	93	- 0 0 1 -	0 1	02	25	93	DIABLO CANYON UNIT 2	0 5 0 0 0 3 2 3
										0 5 0 0 0

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

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11)

X 10 CFR 50.73(a)(2)(ii)(B)

___ OTHER -

(Specify in Abstract below and in text, NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER AREA CODE	TELEPHONE NUMBER
DAVID P. SISK, SENIOR REGULATORY COMPLIANCE ENGINEER	805	545-4420

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
| X | YES (if yes, complete EXPECTED SUBMISSION DATE)	| | NO		05	31	93

ABSTRACT (16)

On January 13, 1993, with Units 1 and 2 in Mode 1 at 100 percent power, PG&E determined that under certain conditions and equipment configurations, the component cooling water (CCW) system water temperature design-basis limits may be exceeded. A one-hour, non-emergency report was made to the NRC in accordance with 10 CFR 50.72 (b)(1)(ii)(B) on January 13, 1993, at 1053 PST.

Prior to this event, analyses had been performed which demonstrated that the CCW system would remain within its design basis temperature limits. These analyses used nominal values for parameters that were judged not to have significant impact on the peak CCW temperature. Subsequently, more refined analyses have been performed using worst-case limits for such parameters rather than nominal values. The results of these analyses indicate that, under a combination of worst-case conditions and parameters, the CCW design temperature limits may be exceeded.

The root cause for this event is under investigation and has not yet been determined. A supplemental LER will be issued by May 31, 1993, to report the root cause and corrective actions to prevent recurrence.

I. Plant Conditions

Units 1 and 2 were in Mode 1 at 100 percent power when the condition described below was identified.

II. Description of Event

A. Summary:

Following recent analysis of the component cooling water (CCW) (CC) and auxiliary salt water (ASW) (BI) systems, PG&E has determined that, under certain conditions and equipment configurations, the CCW water temperature design-basis limits may be exceeded. A one-hour, non-emergency report was made to the NRC in accordance with 10 CFR 50.72 (b)(1)(ii)(B) on January 13, 1993, at 1053 PST.

B. Background:

During the injection phase of a loss-of-coolant accident (LOCA), the CCW system provides cooling water to various components, including the emergency core cooling system (ECCS) pumps (P) and the containment fan cooling units (CFCUs)(BK)(FAN).

In order for the CCW system to ensure cooling of the ECCS pumps, CCW water temperature must remain at or below 120°F for continuous operation, and may exceed 120°F, up to a maximum of 132°F, for no longer than 20 minutes. Temperatures greater than 132°F, or extended operation above 120°F for greater than 20 minutes, could result in damage to the safety injection pumps (BQ)(P) and centrifugal charging pumps (CB)(P).

Technical Specification (TS) 4.6.2.3 requires periodic verification of a CCW cooling water flow rate of greater than or equal to 2000 gpm to each CFCU.

C. Event Description:

To provide operational flexibility with respect to the ASW system, PG&E asked Westinghouse to determine the minimum ASW flow required to ensure the CCW system design-basis temperature limits are not exceeded. The analysis determined the required ASW flow as a function of ASW temperature and initial CCW temperature. Previous analyses had assumed a conservative fixed ASW (ocean) temperature. The reanalysis results were issued by Westinghouse in May 1990 as WCAP 12526. The surveillance test acceptance criteria for the ASW system were then revised to reflect the results of WCAP 12526.

From August 20, 1990, through October 4, 1990, PG&E conducted a Safety System Functional Audit and Review (SSFAR) of the CCW system. One audit finding identified that there were no documented bases for throttle valve positions to ensure that there would be adequate CCW

cooling flows under accident conditions. PG&E initiated Nonconformance Report (NCR) DCO-90-OP-N061 to address this audit finding. The corrective action called for the development and implementation of a documented flow balance of the CCW system.

As part of the SSFAR audit support activities, Engineering performed a review of WCAP 12526. During this review, Engineering noted that the heat input into the CCW system from the CFCUs was based on a CCW flow of 2000 gpm to each CFCU, rather than the larger nominal flow rate (2350 gpm) specified by PG&E. This raised the concern that the use of the lower flow rate could potentially have led to underestimating the heat input into the CCW system. This, in turn, could potentially cause the results of the analysis to be nonconservative.

PG&E contacted Westinghouse to determine the effect of using the nominal flow value may have had on the results of the WCAP. Westinghouse indicated that the CFCU heat input was primarily a function of containment temperature and CCW temperature, and was not particularly sensitive to the CCW flow rate through the CFCUs. Additionally, any increase in heat input during the first phase of the analysis would be offset by reduced heat input in the latter phase due to reduced containment and increased CCW temperatures. Accordingly, the use of heat input values based on 2000 gpm would have a negligible impact on the results of the WCAP. PG&E requested that Westinghouse verify the judgment that the analysis was not sensitive to the CCW flow rate through the CFCU by evaluating the impact of a CFCU flow rate of 2500 gpm.

Westinghouse subsequently confirmed that the WCAP results remained valid with a CCW flow of 2500 gpm to the CFCUs. The basis for this conclusion was a refined analysis of the CFCU performance which resulted in a heat input rate approximately equal to that used in the original analysis (this was formally documented in June 1992 in WCAP 12526, Revision 1). It was noted that an increase in the CCW flows in excess of 2500 gpm would result in a slight increase in the heat transfer into the CCW system. If the increased flows were considered, in conjunction with other worst-case values of ASW flow, ASW temperature, and initial CCW temperature, then a CCW temperature transient in excess of the design-basis limit could potentially occur. However, Westinghouse indicated that it was their engineering judgment that there were sufficient conservatisms in the analysis of the CCW temperature transient that the results of the WCAP remained valid for CFCU flows in excess of 2500 gpm.

PG&E initiated actions to incorporate the 2500 gpm limit into the ongoing CCW system flow balance development. Calculations to support the flow balance development indicated that, due to variations that could occur in the system configuration, the CCW flow rate to the CFCUs could vary between 1600 and 2500 gpm following the implementation of the flow balance. The flow balance would ensure that the design flow of at least 2000 gpm would be achieved in the

event of the design-basis accident, and would further ensure that flows in excess of 2500 gpm could not be achieved, thus preventing overheating of the CCW system. PG&E recognized that for certain nondesign-basis events, the CCW flows to the CFCUs could be less than 2000 gpm, but that the flow rates achieved would provide acceptable heat removal.

During the flow balance procedure development process, current and historical CCW operating flows were reviewed to determine whether the TS surveillance requirement of 2000 gpm per CFCU was met. During this review, the potential to exceed the upper flow balance limit (2500 gpm) was re-evaluated. On January 13, 1993, at 1015 PST, PG&E determined that the CCW system was potentially outside its design basis. A one-hour, non-emergency report was made for Units 1 and 2 in accordance with 10 CFR 50.72 (b)(1)(ii)(B) on January 13, 1993, at 1053 PST.

On January 13, 1993, an assessment of the acceptability of operation in the existing configuration was performed. This assessment documented the engineering judgment that sufficient conservatisms existed in the CCW overheating analyses to ensure that the CCW system would not exceed its design-basis temperature in the existing configuration with all five CFCUs in service. As a further conservatism, a compensatory measure was initiated to remove power from one CFCU on each unit, such that one CFCU will not auto-start as designed during a design-basis accident. The CCW system will remain within its design-basis temperature limits with four CFCUs or fewer in operation, and the CFCU design criteria (including single failure criteria) are met with only four CFCUs.

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

None.

E. Dates and Approximate Times for Major Occurrences:

1. January 13, 1993 at 1015 PST: Event/Discovery date. The CCW system was determined to be potentially outside its design basis.

2. January 13, 1993 at 1053 PST: A one-hour, non-emergency report was made to the NRC in accordance with 10 CFR 50.72 (b)(1)(ii)(B).

F. Other Systems or Secondary Functions Affected:

None.

G. Method of Discovery:

PG&E personnel identified the problem during the technical review of CCW flow balancing issues.

H. Operator Actions:

Operators removed one CFCU from service on each unit pending completion of updated analyses as discussed below in Section V, "Corrective Actions."

I. Safety System Responses:

None.

III. Cause of the Event

A. Immediate Cause:

Prior to this event, analyses had been performed that demonstrated that the CCW system would remain within its design-basis temperature limits. These analyses used nominal values for parameters that were judged not to have significant impact on the peak CCW temperature. Subsequently, more refined analyses have been performed using worst-case limits for such parameters rather than nominal values. The results of these analyses indicate that under a combination of worst-case conditions and parameters, the CCW design temperature limits may be exceeded.

B. Root Cause:

The root cause for this event is under investigation and has not yet been determined. A supplemental LER will be issued by May 31, 1993, to report the root cause.

IV. Analysis of the Event

Westinghouse was contacted to determine the conservatism inherent in the analysis that supports WCAP 12526, Revision 1. Westinghouse indicated that the WCAP is based on a LOCA accident profile generated using existing mass and energy release assumptions consistent with failure of one ASW pump. Westinghouse has performed analyses for other units, using new and approved accident modeling methodologies that result in reductions in peak containment (NH) pressure and temperature of approximately 5 psi and 10 to 20°F., respectively. Although the new methodology has not been used in analyses for Diablo Canyon Power Plant, the NRC has approved this methodology for other similar Westinghouse dry containment nuclear power plants.

It is Westinghouse's engineering judgment that this methodology is applicable to Diablo Canyon Power Plant and, if applied, would reduce the

maximum heat transfer from containment via the CFCUs into the CCW system by 11 to 22 percent due to the new mass/energy release model. The minimum expected reduction in heat transfer input into the CCW system (11 percent) is greater than the additional heat transfer conservatively calculated from the maximum operating equipment configuration (10 percent). Accordingly, the net heat input into the CCW system would not be expected to increase over that analyzed in the WCAP.

Using the new model results (including five operating CFCUs), the CCW temperature design basis would not be exceeded and there is no impairment of the CCW system capability to perform its safety function. Thus, this event did not adversely affect the health and safety of the public.

V. Corrective Actions

A. Immediate Corrective Actions:

As a conservative measure to ensure compliance with the existing analysis, one CFCU on each unit was removed from service pending completion of updated analyses.

B. Corrective Actions to Prevent Recurrence:

PG&E will complete and implement the CCW flow balancing calculations.

Additional corrective actions to prevent recurrence may be determined when the root cause is identified. The root cause and corrective actions will be reported in a supplemental LER.

VI. Additional Information

A. Failed Components:

None.

B. Previous LERs on Similar Events:

LER 1-91-018-01, "Component Cooling Water System Outside Design Basis due to Personnel Error"

PG&E determined that the heat load on the CCW system during the cold-leg recirculation phase following a LOCA could potentially exceed the heat load during the injection phase. Because the injection phase had previously been considered to be the limiting case for CCW temperature, this condition was considered to be outside the design basis of the CCW system. The root cause was attributed to personnel error. The corrective actions to prevent recurrence included additional training for design engineers to emphasize that data known to be conservative for one application may be nonconservative for another application.