Pacific Gas and Electric Company

Diablo Canyon Power Plant
P.O. Box 56
Avila Beach, CA 93424

800.545.6000

December 23, 2002

PG&E Letter DCL-02-146

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 2-2002-004-00
Manual Start of Unit 2 AFW Pumps Due to Ocean Debris and High Swells

Dear Commissioners and Staff:

In accordance with 10 CFR 50.73 (a)(2)(iv)(B)(6), PG&E is submitting the enclosed licensee event report regarding a manual start of the Unit 2 AFW pumps in conjunction with a rapid manual shutdown in response to high debris loading on the circulating water traveling screens as result of high ocean swells.

This event was considered to be of very low risk significance and did not adversely affect the health and safety of the public.

Sincerely,

David H. Oatley
Vice President and General Manager – Diablo Canyon

baf5/2246/A0568250
Enclosure
cc/enc: Ellis W. Merschoff
David L. Proulx
Girija S. Shukla
Diablo Distribution
INPO

IE22

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 7

TITLE (4)

Manual Start of Unit 2 AFW Pumps Due to Ocean Debris and High Swells

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
11	08	2002	2002	- 0 0 4 -	0 0	12	23	2002		

OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11)	
1	X	10 CFR 50.73 (a)(2)(iv)(B)(6),
POWER LEVEL (10)		OTHER
0 2 0		(SPECIFY IN ABSTRACT BELOW AND IN TEXT, NRC FORM 366A)

LICENSEE CONTACT FOR THIS LER (12)

	TELEPHONE NUMBER	
	AREA CODE	
Larry M. Parker - Senior Regulatory Services Engineer	805	545-3386

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

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MON	DAY	YR
[ ] YES (If yes, complete EXPECTED SUBMISSION DATE)	[X] NO				

ABSTRACT (Limit to 1400 spaces. i.e., approximately 15 single-spaced typewritten lines.) (16)

On November 8, 2002, at 0633 PST, with Unit 2 in Mode 1 (Power Operation) at 20 percent reactor power, operators manually tripped the turbine due to indications of high differential pressure on the traveling screens at the intake structure. Operators also manually tripped both circulating water pumps resulting in a loss of condenser. In accordance with the abnormal operating procedure for loss of normal heat sink, operators manually shut down the reactor and started the motor driven auxiliary feed water pumps.

PG&E has developed extensive models to help predict the impact of Pacific Ocean storms, and to give adequate time to prepare for such events. PG&E anticipated the potential adverse affects from high swells and ocean debris, and had reduced power to 20 percent to facilitate a plant shutdown if necessary, without a reactor trip.

PG&E cannot entirely eliminate the potential need to manually shut down the reactor when high seas and dislodged plant life from the ocean floor result in heavy debris loading on the traveling screens. Therefore, there are no corrective actions to prevent recurrence.

TEXT

I. Plant Conditions

Unit 2 was in Mode 1 operating at 20 percent reactor power. Unit 1 was in Mode 5 (Cold Shutdown) for a generator rotor replacement.

II. Description of Problem

A. Background

The circulating water system [KE] provides a continuous saltwater supply to the main condenser [COND], condensate cooler [CLR], service water cooling system [KG], and intake cooling system [KE]. The saltwater enters the cooling water intake structure by passing through bar racks and then through traveling screen assemblies. Each unit has two single-stage circulating water pumps (CWP) and each CWP has three traveling screens. The bar racks and traveling screens prevent debris and sea life from entering the circulating water system and restricting flow through the main condenser.

The screens for the CWPs are operated either in manual or automatic. When in manual, the screens are controlled by the operator and can be operated in slow or high speed.

Due to a past history of kelp loading as a result of Pacific storms, PG&E has implemented weather-monitoring systems, and developed extensive models to help predict the potential impact to the plant. In addition to the monitoring systems and models, PG&E has procedures governing the proper response to any high swell condition, or other weather related warnings.

Section 6.4.10 of operating procedure OP O-28, "Intake Management" states that, "a reduction to less than or equal to 25 percent power should be considered in the event a high swell condition is predicted. Operation with the Unit well below the P-9 permissive will allow a turbine [TA] trip to be performed simultaneously with a controlled, rapid shutdown of the reactor [AC], thereby avoiding a reactor trip."

Operating procedure OP L-4, "Normal Operation at Power" provides instructions for power maneuvers between 20 percent and 100 percent reactor power.

TEXT

Abnormal operating procedure OP AP-7, "Degraded Condenser" gives operators specific guidance in the event of increasing traveling screen differential pressure, including a reduced load shutdown.

B. Event Description

A high swell warning was issued on November 7, 2002 at 1200 PST to allow adequate time to ensure the proper measures were taken as per operating procedure OP O-28, "Intake Management."

On November 7, 2002, following procedure OP O-28, and OP L-4, operators had ramped Unit 2 reactor power from 100 percent to 20 percent in anticipation of a significant storm and associated high swells and ocean debris. The possibility of losing the circulating water pumps [KE] as a result of the storm was anticipated, and procedures specify maintaining reactor power below 25 percent during these conditions.

On November 8, 2002 at approximately 0630 PST, the Unit 2 control room operator received an alarm indicating a high differential pressure, over 70 inches, across the intake screens [KE]. Procedure OP AP-7, Section C, dictates that if the difference in pressure across the screen is 70 inches or more, the operator is to perform a reduced load shutdown. This procedure includes the following actions:

- Trip the turbine
- Insert control rods [AA] to shut down the reactor
- Trip the running CWP
- Close the MSIV's [SB][ISV]
- Verify 10% steam dump controllers are set to maintain S/G pressure LESS THAN OR EQUAL TO 1005 PSIG
- Start both MD AFW [BA] Pumps
- Trip the MFW [SJ] Pps.
- Perform Attachment 4.1, Hot Condenser Cooldown Instructions
- Refer to OP L-5 for completion of shutdown activities

The Unit 2 shift foreman then initiated a rapid manual shutdown of the reactor. At 0643 PST, the control banks were fully inserted into the reactor. Mode 3 was declared at 0643 PST.

At 1300 PST, the shift manager made an 8-hour non-emergency notification to the NRC in accordance with 10 CFR 50.72(b)(3)(iv), for valid manual actuation of the auxiliary feed water (AFW) pumps in conjunction with the manual shut down.

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

None.

D. Other Systems or Secondary Functions Affected

None. The auxiliary saltwater (ASW) [BS] system was not affected by the debris and swells, due primarily to the lower flow-rate and lower velocity through the ASW traveling screens.

E. Method of Discovery

Licensed plant operators following abnormal procedure OP AP-7, manually started the AFW pumps. The high differential pressure across the traveling screens was immediately known to licensed plant operators due to alarms and indications received in the control room.

F. Operator Actions

Operators performed the actions specified in abnormal procedure OP AP-7, Section C "perform reduced load shutdown."

G. Safety System Responses

As per design, the two standby containment fan coolers [EK][FAN] and the standby ASW pump automatically started on the transfer to start up power.

III. Cause of the Problem

A. Immediate Cause

The immediate cause of the manual start of the motor-driven AFW pumps was the procedural guidance in abnormal procedure OP AP-7. In the event of high differential pressure across the circulating water traveling screens, the procedure directs operators to take actions that will prevent equipment damage, including tripping the turbine, and shutting down the CWPs. Without CWPs, the condenser could be damaged from continued steam input. Therefore, the procedure directs operators to terminate steam flow to the condenser by closing the main steam isolation valves and tripping the turbine-driven main feedwater pumps. In order to

maintain reactor coolant system heat removal without main feedwater, the procedure directs operators to start the motor-driven AFW pumps prior to tripping the main feed water pumps.

B. Root Cause

The root cause of the event was the sudden heavy debris loading on the circulating water system traveling screens during a period of high seas that dislodged plant life from the ocean floor.

IV. Assessment of Safety Consequences

Previously analyzed Final Safety Analysis Report Update, Chapter 15, Condition II events, envelope a manual turbine trip from 20 percent power. The 10 percent steam dump valves and the pressurizer controlled the reactor coolant temperature and pressure in accordance with plant design and licensing basis. Therefore, the health and safety of the public were not adversely affected by this event.

The event was not evaluated using the criteria defined in the NRC's Significance Determination Process because the transient is accounted for in the performance indicator program as an unplanned power change.

V. Corrective Actions

A. Immediate Corrective Actions

Plant personnel reviewed the plant equipment response following the manual reactor shutdown and confirmed that the equipment operated within design requirements. Plant management initiated an event response plan to establish a controlled restart of plant systems following confirmation of decreased storm activity.

B. Corrective Actions to Prevent Recurrence

PG&E cannot entirely eliminate the potential need to expedite manual reactor shutdowns when high seas dislodge plant life from the ocean floor resulting in heavy debris loading on the traveling screens. Therefore, there are no corrective actions to prevent recurrence.

TEXT

VI. Additional Information

A. Failed Components

None.

B. Previous Similar Events

LER 1-99-009, "Manual Reactor Trips Due to Heavy Debris Loading of the Traveling Screens During a Pacific Ocean Storm," reported a dual unit manual reactor trip on October 28, 1999. With Unit 1 at 50 percent power, and Unit 2 at 30 percent power, operators initiated manual reactor trips due to high differential pressure across the circulating water traveling screens caused by debris loading due to heavy swells from a major Pacific storm.

LER 2-98-005, "Manual Reactor Trip Due to Heavy Debris Loading of the Circulating Water System During a Pacific Ocean Storm," reported a Unit 2 manual reactor trip from 100 percent power on December 1, 1998. Operators initiated a manual reactor trip due to high differential pressure across the circulating water traveling screens caused by debris loading due to heavy swells from a major Pacific storm. Corrective actions included revising operating orders for storm conditions, improving circulating water system indication in the control room, and providing additional training to operators regarding lessons learned from this event.

LER 1-95-017-00, "Manual Reactor Trip Due to Heavy Loading of Traveling Screens," reported a Unit 1 manual reactor trip from 50 percent power on December 13, 1995. Operators initiated a manual reactor trip due to high differential pressure across the circulating water traveling screens caused by debris loading due to heavy swells from a major Pacific storm. Corrective actions included adding more screen rakes to the traveling screens to improve debris removal efficiency, and additional operator training.

LER 2-95-002, "Manual Reactor Trip Due to Heavy Debris Loading and Damage to Traveling Screens," reported a Unit 2 manual reactor trip from 40 percent power on September 23, 1995. Operators initiated a manual reactor trip when the circulating water traveling screens stopped due to high differential pressure across the traveling screens caused by debris loading due to heavy swells from a major Pacific storm. Corrective actions for this event included installation of new kelp rakes and revision of OP AP-7 to reduce or prevent damage to the traveling screens.

TEXT

LER 2-94-012-00, "Manual Reactor Trip Due to Circulating Water Pump Cavitation as a Result of Intake Screen Fouling," reported a Unit 2 manual reactor trip from 35 percent power on December 19, 1994. Operators tripped Unit 2 due to CWP cavitation caused by intake screen fouling. Corrective actions included installing an audible alarm at the intake that activates if a traveling screen drive fails, installing an alarm in the control room for high condenser differential pressure, revising OP AP-7 to include guidance on condenser fouling, revising the operator rounds sheets to provide guidance on monitoring performance of the intake screen wash system, and installing a computer program that enables control room operators to monitor and trend condenser differential pressures.

PG&E cannot entirely eliminate the potential need to expedite manual shutdown when high seas and dislodged plant life from the ocean bottom result in heavy debris loading on the traveling screens. However, the corrective actions taken for the above previous events helped mitigate the effects of the storm. For example, development and use of extensive storm prediction models, combined with a proceduralized intake debris management strategy, were successful in protecting the circulating water traveling screens while at the same time avoiding the need for initiation of a manual reactor trip.