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PG&E Letter DCL-13-117

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

10 CFR 50.73

Docket No. 50-275, OL-DPR-80
Diablo Canyon Unit 1

Licensee Event Report 1-2013-007-00, Auxiliary Feedwater Actuation Due to a Main
Feedwater Pump Trip

Dear Commissioners and Staff;

Pacific Gas and Electric Company (PG&E) submits the enclosed Licensee Event Report (LER) for a valid manual actuation of the auxiliary feedwater system when a main feedwater pump tripped. PG&E is submitting this LER in accordance with 10 CFR 50.73(a)(2)(iv)(A).

PG&E makes no new or revised regulatory commitments (as defined by NEI 99-04) in this report. PG&E will implement corrective actions in accordance with the Diablo Canyon Power Plant Corrective Action Program.

This event did not adversely affect the health and safety of the public.

Sincerely,

Barry S. Allen

ssz1/4040/50588010/50588110/50588799

Enclosure

cc\enc: Brian J. Benney, NRR Project Manager
Marc L. Dapas, NRC Region IV
Thomas R. Hipschman, NRC Senior Resident Inspector
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**LICENSEE EVENT REPORT (LER) U.S. NUCLEAR REGULATORY COMMISSION
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NARRATIVE

I. Plant Conditions

Prior to the event, Unit 1 was operating in Mode 1 (Power Operation) at approximately 100 percent reactor [RCT] power with normal operating reactor coolant temperature and pressure. Following the event, plant operators stabilized the reactor at approximately 50 percent reactor power.

II. Problem Description

A. Background

The main feedwater pump [P] delivers high-temperature, high-pressure feedwater to the steam generators (SGs) as required by the secondary plant steam load. Both turbine-driven [TRB] main feedwater pumps are controlled by governor valves [65] and a control system. The control system uses oil pressure to hydraulically open and close the valves on the turbine as needed. Upon a loss of oil pressure, the turbine will automatically shut down.

The Auxiliary Feedwater (AFW) System [BA] supplies feedwater to the SGs when the main feedwater system [SJ] is unavailable. It provides an engineered safety feature of removing decay heat from the reactor coolant system [AB].

B. Event Description

On October 14, 2013, at 15:11 PDT, the overcurrent relay [50] for the Bus [BU] feeder to 480 V Bus 15D tripped during relay maintenance. At the time of the trip, the Main Feedwater Pump 1-1 alternating current (AC) Lube Oil Pump 1 (T1MOP1) was in service and fed from Bus 15D. Main Feedwater Pump 1-1 AC Lube Oil Pump 2 (T1MOP2) was in standby, fed from Bus 15E. The loss of Bus 15D resulted in a loss of power to T1MOP1, which triggered an automatic start of T1MOP2. T1MOP2 started after the loss of Bus 15D, but the control oil pressure dropped rapidly and Main Feedwater Pump 1-1 tripped on low control oil pressure before T1MOP2 could recover the pressure.

The low pressure transient in the control oil header during an AC oil pump swap was recognized as a threat to reliable feedwater pump operation and a design change in 1992 installed hydraulic accumulators [ACC] in the system for each pump. The purpose of the accumulator is to maintain oil pressure during an AC oil pump swap which would occur during the loss of the running pump. The accumulator consists of a vertical steel tank [TK] with an internal nitrile bladder precharged with nitrogen.

This oil accumulator system failed to maintain pressure during the pump swap due to a nitrogen leak from its bladder assembly.

Following the trip of the Main Feedwater Pump 1-1, the turbine control system [JJ] initiated an automatic ramp from 100 percent to 50 percent turbine load. Operators entered Abnormal Operating Procedure (OP) AP-15, "Loss of Feedwater Flow," and started both motor-driven AFW Pumps 1-2 and 1-3, based on procedural guidance and existing plant conditions.

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The AFW system actuation was reported in accordance with 10 CFR 50.72(b)(3)(iv)(a) in NRC Event Notification 49442. The valid actuation is reportable as a Licensee Event Report in accordance with 10 CFR 50.73(a)(2)(iv) (A).

C. Status of Inoperable Structure, Systems, or Components That Contributed to the Event

The main feedwater pump control oil system accumulator bladder system failed to maintain its nitrogen precharge, which resulted in a low pressure transient and main feedwater pump trip.

D. Other Systems or Secondary Functions Affected

The turbine control system automatic ramp from 100 percent to 50 percent power was successful. Both motor driven AFW pumps operated as expected.

E. Method of Discovery

Alarms [ALM] and indications received in the control room alerted licensed plant operators to the event.

F. Operator Actions

Operators entered Abnormal Operating Procedure (OP) AP-15, "Loss of Feedwater Flow," and started both motor-driven AFW Pumps 1-2 and 1-3, based on procedural guidance and existing plant conditions.

G. Safety System Responses

All safety systems responded as designed.

III. Cause of the Problem

DCPP determined that the cause of the Bus 15D trip was an organizational weakness and failure to incorporate operating experience in the relay maintenance procedure.

DCPP determined that the main feedwater pump trip occurred due to loss of power to the in-service control pump (caused by the 480 V bus deenergization) and the inability of the backup control oil system to respond quickly enough due to nitrogen precharge leakage from an accumulator bladder. Several contributory causes were related to not monitoring the bladder pressure, not checking for leaks at operating pressure, and not providing guidance on bladder replacement.

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IV. Assessment of Safety Consequences

The protective features that shutdown the Main Feedwater Pump 1-1 operated as designed. The plant response involved the turbine control system, operations staff and the AFW system. All safety systems responded as expected and designed. Overall, this was an uncomplicated event and there were no resulting personnel, off-site radiological, or environmental safety issues caused by this event. The safety significance of this event is very low. This event did not adversely affect the health or safety of the public.

V. Corrective Actions

A. Immediate Corrective Actions

Similar inservice relay testing was halted until plant procedures incorporate the lessons learned and external operating experience. Specifically, a 1997 event (OE 161841) involved an inadvertent relay actuation on the General Electric model 12IAC53A101A relay at Fort Calhoun station.

The accumulator bladder was replaced and tested prior to operation.

B. Other Corrective Actions

Operators will record the accumulator pressure daily. Accumulator bladder maintenance and testing processes will also be enhanced.

VI. Additional Information

A. Failed Components

The main turbine control oil system accumulator failed to maintain its precharge pressure.

B. Previous Similar Events

Following a 1999 kelp overload at the intake, oil was found in this accumulator's pressure indicator, suggesting a bladder tear. The bladder was replaced at that time. It was replaced again in 2012 as part of a preventative maintenance activity.