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January 27, 2012

PG&E Letter DCL-12-010

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 1-2011-001-01
Mode Transition with Turbine-Driven Auxiliary Feedwater Pump 1-1 Inoperable

Dear Commissioners and Staff;

Pacific Gas and Electric Company (PG&E) submits the enclosed Licensee Event Report (LER) supplement regarding an improper mode transition with an inoperable turbine-driven auxiliary feedwater pump and a failure to meet Technical Specification Limiting Condition for Operation 3.0.4. PG&E is submitting this LER supplement in accordance with 10 CFR 50.73(a)(2)(i)(B) and providing the cause and corrective actions for the event. This event was reported under 10 CFR 50.73(a)(2)(ii)(B) and 10 CFR 50.73(a)(2)(v)(B). This LER supplement also provides an assessment of the safety consequences, details on the failed component, and information on a previous similar event.

There are no new or revised regulatory commitments in this report.

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

Sincerely,

James R. Becker

mlpy/50368977, Task 18

Enclosure

cc/enc: Elmo E. Collins, NRC Region IV
Michael S. Peck, NRC Senior Resident Inspector
Alan B. Wang, NRR Project Manager
INPO
Diablo Distribution

NRC FORM 366 (10-2010)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB: NO. 3150-0104		EXPIRES: 10/31/2013								
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)				Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.										
1. FACILITY NAME Diablo Canyon Power Plant Unit 1				2. DOCKET NUMBER 05000 275		3. PAGE 1 OF 4								
4. TITLE Mode Transition with Turbine-Driven Auxiliary Feedwater Pump 1-1 Inoperable														
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED					
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER				
11	06	2010	2011	1	1	01	27	2012	FACILITY NAME	05000				
									FACILITY NAME	DOCKET NUMBER				
										05000				
9. OPERATING MODE 3			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)											
10. POWER LEVEL 000			<input type="checkbox"/> 20.2201(b)			<input type="checkbox"/> 20.2203(a)(3)(i)			<input type="checkbox"/> 50.73(a)(2)(i)(C)			<input type="checkbox"/> 50.73(a)(2)(vii)		
			<input type="checkbox"/> 20.2201(d)			<input type="checkbox"/> 20.2203(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(viii)(A)		
			<input type="checkbox"/> 20.2203(a)(1)			<input type="checkbox"/> 20.2203(a)(4)			<input checked="" type="checkbox"/> 50.73(a)(2)(ii)(B)			<input type="checkbox"/> 50.73(a)(2)(viii)(B)		
			<input type="checkbox"/> 20.2203(a)(2)(i)			<input type="checkbox"/> 50.36(c)(1)(i)(A)			<input type="checkbox"/> 50.73(a)(2)(iii)			<input type="checkbox"/> 50.73(a)(2)(ix)(A)		
			<input type="checkbox"/> 20.2203(a)(2)(ii)			<input type="checkbox"/> 50.36(c)(1)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(iv)(A)			<input type="checkbox"/> 50.73(a)(2)(x)		
			<input type="checkbox"/> 20.2203(a)(2)(iii)			<input type="checkbox"/> 50.36(c)(2)			<input type="checkbox"/> 50.73(a)(2)(v)(A)			<input type="checkbox"/> 73.71(a)(4)		
			<input type="checkbox"/> 20.2203(a)(2)(iv)			<input type="checkbox"/> 50.46(a)(3)(ii)			<input checked="" type="checkbox"/> 50.73(a)(2)(v)(B)			<input type="checkbox"/> 73.71(a)(5)		
			<input type="checkbox"/> 20.2203(a)(2)(v)			<input type="checkbox"/> 50.73(a)(2)(i)(A)			<input type="checkbox"/> 50.73(a)(2)(v)(C)			<input type="checkbox"/> OTHER		
<input type="checkbox"/> 20.2203(a)(2)(vi)			<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)			<input type="checkbox"/> 50.73(a)(2)(v)(D)			Specify in Abstract below or in NRC Form 366A					
12. LICENSEE CONTACT FOR THIS LER														
FACILITY NAME Thomas R. Baldwin, Manager, Regulatory Services								TELEPHONE NUMBER (Include Area Code) (805) 545-4720						
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT														
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX					
B	BA	0065	W290	Y										
14. SUPPLEMENTAL REPORT EXPECTED								15. EXPECTED SUBMISSION DATE		MONTH	DAY	YEAR		
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE)								<input checked="" type="checkbox"/> NO						
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)														
<p>On January 3, 2011, Pacific Gas and Electric (PG&E) identified that the Turbine-Driven Auxiliary Feedwater Pump 1-1 (TD AFW PP 1-1) was inoperable in Mode 3 (Hot Standby) on November 6, 2010, due to an improperly set speed governor. The TD AFW PP 1-1 governor had been replaced on October 27, 2010, prior to entry into Mode 3. The TD AFW PP 1-1 post maintenance test (PMT) required steam generator pressure to be greater than 650 psig, necessitating entry into Mode 3 to perform the test. This testing and adjustment was performed on November 6, 2010. On January 3, 2011, plant staff reviewing the PMT and the governor adjustment performed on November 6, 2010, identified that the TD AFW PP 1-1 as-found condition exceeded 4,300 rpm. This initial speed was greater than the engineering-established acceptance criteria of 4,260 rpm for surveillance testing of the pump. PG&E determined that the TD AFW PP 1-1 was consequently inoperable during the mode transition from Mode 4 (Hot Shutdown) to Mode 3.</p> <p>Technical Specification Limiting Condition for Operation (TS LCO) 3.7.5 requires three trains of AFW to be operable in Modes 1 through 3. With the TD AFW PP 1-1 inoperable during the mode transition, entry into Mode 3 without TS LCO 3.7.5 being met constitutes a violation of TS LCO 3.0.4.</p> <p>The cause of this event was that plant-specific specifications were not provided for refurbishment of the replacement governor, resulting in the improperly set speed governor. Maintenance plans and procedures were modified to ensure the proper specifications are provided for refurbishment/replacement of TD AFW PP speed governors.</p>														

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NARRATIVE

I. Plant Conditions

When the event occurred, Unit 1 was transitioning from Mode 4 (Hot Shutdown) to Mode 3 (Hot Standby). The reactor coolant system (RCS) temperature and pressure at this time were approximately 350 degrees Fahrenheit and 1,000 pounds per square inch (psig) respectively, and steam generator (SG) pressure was approximately 115 psig. At the time of testing, the SG pressure was approximately 1,000 psig.

II. Description of Problem

A. Background

The Diablo Canyon Power Plant (DCPP) Unit 1 is a pressurized water reactor (PWR) with four reactor coolant loops (RCL)[AB] to circulate reactor coolant to each of the four SGs. Each SG is a vertical U-tube design provided by the Nuclear Steam Supply System (NSSS) vendor, Westinghouse. The auxiliary feedwater (AFW) system [BA] is a safety-related system that serves as a backup supply of feedwater to the secondary side of the SGs. The AFW system maintains the heat sink function of the SGs whenever the main feedwater (MFW) system is unavailable.

The AFW system consists of three AFW supply trains. One train employs a full capacity, approximately 780 gallons per minute steam turbine-driven AFW Pump (TD AFW PP) 1-1, aligned to all four SGs. The other two trains consist of half-capacity motor-driven AFW Pumps (MD AFW PP) 1-2 and 1-3, each supplying approximately 390 gpm to two of the four SGs, with the capability to be manually aligned to any of the four SGs. The normal operation of the AFW system, which is during unit startup and shutdown, is to supply the SGs with a secondary heat sink while MFW is unavailable.

Technical Specification Limiting Condition for Operation (TS LCO) 3.7.5, "Auxiliary Feedwater System," requires three AFW trains to be operable in Modes 1, 2, and 3. TS LCO 3.7.5 is modified by a note that prohibits mode transition with an inoperable AFW pump. Under Surveillance Requirement (SR) 3.7.5.2, testing of the TD AFW PP 1-1 is required to be performed within 24 hours after reaching 650 psig steam pressure in the SGs.

B. Event Description

On October 27, 2010, during the Unit 1 Sixteenth Refueling Outage (1R16), plant personnel completed replacement of the speed governor on the TD AFW PP 1-1. On November 6, 2010, at 0512 PST, Unit 1 entered Mode 3.

On November 6, 2010, at 2222 PST, DCPP commenced Surveillance Test Procedure (STP) P-AFW-11, "Routine Surveillance Test of Turbine-Driven Auxiliary Feedwater Pump 1-1." This STP was used in conjunction with a maintenance procedure to set the speed of the governor and also served as post-maintenance testing (PMT) for the TD AFW PP 1-1. Per the test procedure, the pump was declared inoperable prior to testing. When steam was admitted to the TD AFW PP 1-1 to raise the speed, test personnel observed speeds in excess of 4,300 rpm, at which point the governor had still not assumed control. Plant personnel interrupted the ramp and made internal adjustments to the governor in order to achieve a pump speed below 4,260 rpm (the maximum allowable recirculation speed stated in the STP). After the adjustments, the pump reached a recirculation speed of 4,210 rpm. The test was completed satisfactorily and the TD AFW PP 1-1 was secured on November 7, 2010, at 0026 PST.

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C. Other Systems or Secondary Functions Affected

No additional safety systems were adversely affected by this event.

D. Method of Discovery

The condition was discovered on January 3, 2011, when plant personnel stated that the TD AFW PP 1-1 had exceeded 4,300 rpm prior to governor adjustment.

E. Status of Inoperable Structures, Systems, or Components that Contributed to the Event

When the pump recirculation speed exceeded 4,300 rpm without governor intervention, the TD AFW PP 1-1 was considered inoperable because it operated at a speed outside the band specified in the test procedure and in DCP's Updated Final Safety Analysis Report (UFSAR). MD AFW PP 1-2 and 1-3 remained operable from entry into Mode 3 through completion of the TD AFW PP 1-1 governor adjustment and testing.

F. Operator Actions

No actions were required by plant operators.

G. Safety System Responses

Not applicable for this event.

III. Cause of the Problem

The apparent cause of this event was that the replacement TD AFW PP 1-1 speed governor was configured in accordance with the original speed governor build/testing specification. There was no documentation of internal adjustments made to the original speed governor; however, it was determined that the original speed governor had been adjusted in the past. As such, the refurbishment/replacement governor was improperly set to be a like-for-like replacement, resulting in a higher than acceptable startup speed. This condition resulted in the TD AFW PP 1-1 being inoperable during mode transition.

IV. Assessment of Safety Consequences

TD AFW PP flow increases with pump speed but is limited by the overspeed trip. Plant personnel worked with the speed governor vendor and found that the governor would have stabilized the pump at a speed below the overspeed trip setpoint. With the TD AFW PP inoperable, the two MD AFW PPs provide adequate AFW heat removal capability for the Mode 3 low decay-heat conditions.

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A risk assessment was performed for the plant condition existing at the time of this event. The risk assessment assumed that the TD AFW PP 1-1 was in an overspeed condition and no other structures, systems, or components were out of service during the associated time period. This risk assessment concluded that the increased core damage probability and the increased large early release probability were approximately 3E-7 and 7E-8, respectively, well below the risk significance criteria. This low risk was mainly due to the short duration (20 hours) of the TD AFW PP overspeed condition.

In summary, the actual Mode 3 conditions that existed during the period with the increased TD AFW PP 1-1 speed posed no significant threat to nuclear safety.

V. Corrective Actions

A. Immediate Corrective Actions

Plant personnel adjusted pump speed to an acceptable range.

B. Corrective Actions to Prevent Recurrence

1. Provided a build/testing specification to the vendor to ensure refurbished/replacement governors are properly set up.
2. Revised maintenance procedures and plans to update build/testing specifications when internal adjustments are performed.
3. Revised plant procedures for TDAFW governor replacement so that a preservice test is conducted following the replacement.

VI. Additional Information

A. Failed Components

When the TD AFW PP 1-1 was tested after transitioning into Mode 3, the pump speed governor did not perform its required function of controlling the speed within the acceptable band. Details on the governor are provide below:

Manufacturer: Woodward Governor Co.
Model Number: PG-A
Manufacturer Serial Number: 1537799

B. Previous Similar Events

The replacement of the Unit 2 TDAFW PP 2-1 speed governor during the Unit 2 Fourteenth Refueling Outage (2R14) was reviewed and it was discovered that the turbine-driven pump exhibited similar issues. On April 10, 2008, after entry into Mode 3 from Mode 4, the TD AFW PP 2-1 as-found pump speed was lower than the minimum value specified in the STP; however, it would not have impacted the system's function, and thus was not a condition that could have prevented the fulfillment of a safety function. This event, which included a mode transition prohibited by TS, was uncovered more than three years after the incident and was therefore not reported in accordance with 10 CFR 50.72 or 50.73. The corrective actions detailed in this Licensee Event Report apply to, and will prevent recurrence of, this issue for both units at DCP.