Pacific Gas and Electric Company

Diablo Canyon Power Plant
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October 16, 2012

PG&E Letter DCL-12-096

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

10 CFR 50.73

Docket No. 50-323, OL-DPR-82
Diablo Canyon Unit 2
Licensee Event Report 2-2012-001-00, Failure to Meet Emergency Diesel Generator Technical Specifications

Dear Commissioners and Staff:

Pacific Gas and Electric Company (PG&E) is submitting the enclosed Licensee Event Report (LER) regarding the discovery of a broken emergency diesel generator fuel oil booster pump drive belt and subsequent failure to meet plant technical specifications. PG&E is submitting this LER in accordance with 10 CFR 50.73(a)(2)(i)(B) and 10 CFR 50.73(a)(2)(v)(D).

PG&E makes no new or revised regulatory commitments (as defined by NEI 99-04) in this report.

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

Sincerely,

Barry S. Allen
Site Vice President

wrl8/6980/50507816
Enclosure
cc/enc: Elmo E. Collins, NRC Region IV
Laura H. Micewski, Acting NRC Senior Resident Inspector
Joseph M. Sebrosky, NRR Senior 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

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.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Diablo Canyon Power Plant, Unit 2	05000-323	1 OF 4

4. TITLE

Failure to Meet Emergency Diesel Generator Technical Specifications

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
08	18	2012	2012	- 001 -	00	10	16	2012	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

1

10. POWER LEVEL

100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☑ 50.73(a)(2)(i)(B)	☑ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Wilbert R. Landreth, Regulatory Services Engineer	(805) 545-6980

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

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☑ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On August 18, 2012, Diablo Canyon Power Plant (DCPP) Unit 2 Operations personnel discovered that the belt connecting Emergency Diesel Generator (EDG) 2-3 to its fuel oil booster pump (FOBP) was broken. DCPP operators declared EDG 2-3 inoperable, entering Technical Specification (TS) 3.8.1. On August 21, 2012, at 0330, operators declared EDG 2-3 operable after replacing both the FOBP and its drive belt. The cause analysis concluded that the belt and FOBP had failed following satisfactory performance of a surveillance test on August 3, 2012, at 1304 PDT. EDG 2-3 was therefore inoperable longer than allowed by TS 3.8.1.B.4, and is thus reportable under 10 CFR 50.73(a)(2)(i)(B).

During the time between August 3, 2012, at 1304 PDT, and August 21, 2012, at 0330 PDT, EDG 2-2 was declared inoperable twice for testing, but was still available. When EDG 2-2 was inoperable, DCPP Unit 2 only had one operable EDG, since the broken belt rendered EDG 2-3 inoperable. Two EDGs are required to be operable to mitigate the consequences of a design basis accident, making this situation reportable under 10 CFR 50.73(a)(2)(v)(D).

PG&E will reduce the EDG 2-3 drive belt tension specification in plant procedures pending vendor approval. PG&E will establish a periodic replacement strategy for the FOBP in lieu of the present condition-monitored replacement strategy.

NARRATIVE

I. Plant Conditions

On August 18, 2012, Unit 2 was in Mode 1 (Power Operation) at 100 percent power.

II. Problem Description

A. Background

Diablo Canyon Power Plant (DCPP) Unit 2 has three emergency diesel generators (EDGs) [DG] that provide vital backup power to three electrical buses [BU] to mitigate the consequences of a design basis accident (DBA) whenever normal or off-site power sources are unavailable. DCPP EDGs are designed to function so that a single failure of any EDG will not jeopardize the capability of the remaining EDGs to start and provide power to operate the shutdown systems required to mitigate any DBA condition.

Each EDG has a single fuel oil booster pump (FOBP) [P] driven by a belt connected to the EDG crankshaft extension shaft. The FOBP supplies fuel oil from the diesel engine's day tank [TK] to each cylinder's fuel oil injection pump. The engine fuel oil system [DC] and FOBP are required for diesel operation. However, because of the independence of each diesel and its associated powered bus, a single failure involving one diesel will not cause a failure of any other EDG to perform its designed safety functions.

B. Event Description

On August 18, 2012, the DCPP Unit 2 Operations turbine building (TB) watch discovered a broken EDG 2-3 FOBP belt. Operators declared EDG 2-3 inoperable, entering Technical Specification (TS) 3.8.1, "AC Sources - Operating," Condition B, "One DG inoperable." TS 3.8.1 and its associated TS Bases required EDG 2-3 to be returned to operable within 7 days for unplanned maintenance. Security personnel evaluated the as-found condition of the EDG 2-3 drive belt and concluded that the belt had not been broken due to sabotage. The other five EDGs have different FOBP belts, which cause lower side loading on the pumps. Plant engineers and operators walked down all five other EDGs and found no visible damage of the belts or FOBPs.

Plant personnel evaluated the pump's internal material condition. Normally, the FOBP easily rotates by hand with no drive belt attached. The FOBP would not rotate. Plant staff disassembled the pump and identified significant and uneven wear within the shaft bushing, significant and uneven scoring wear on the pump case faces, and galling on the internal gear [GR] faces, indicative of side loading on the pump. With normal side loading and adequate lubrication, the bushing would not be expected to wear unevenly and lead to shaft skewing. However, with excessive side loading, this would be expected to occur.

DCPP Engineering performed a thorough evaluation of plausible causes of the broken belt and seized FOBP that included discussions with the EDG vendor and FOBP vendor. Based upon the inspection results and vendor discussions, DCPP Engineering concluded that the FOBP drive belt failed because the FOBP seized. The FOBP seized because the excessive drive belt tension caused uneven side loading, bushing wear, and shaft skewing. This

prevented pump sheave rotation that resulted in the belt snapping during coast-down on August 3, 2012, at 1304 PDT, following EDG 2-3's satisfactory performance of DCPP Surveillance Test Procedure (STP) M-9A, "Diesel Engine Generator Routine Surveillance Test."

On August 20, 2012, DCPP Maintenance personnel replaced the FOBP and its drive belt. On August 21, 2012, at 0330 PDT, PG&E declared EDG 2-3 operable. PG&E failed to meet TS 3.8.1, Condition B, "One DG inoperable," because EDG 2-3 was not returned to operable status within the required 7-day completion time for unplanned maintenance after EDG 2-3 belt and FOBP failure following the test run on August 3, 2012, at 1304 PDT.

During the time between August 3, 2012, at 1304 PDT, and August 21, 2012, at 0330 PDT, EDG 2-2 was taken out of service and declared inoperable twice to perform surveillance testing. However, EDG 2-2 was still available for use via manual operator action. For those periods that EDG 2-2 was declared inoperable, DCPP Unit 2 only had one operable EDG, when two are required to be operable to perform the designed safety function of providing vital emergency power. This condition would have prevented the fulfillment of the EDG's designed safety function of mitigating the consequences of a DBA.

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

None.

D. Other Systems or Secondary Functions Affected

None.

E. Method of Discovery

The DCPP Unit 2 Operations turbine building watch discovered the broken EDG 2-3 FOBP belt.

F. Operator Actions

DCPP Operators entered TS 3.8.1, "AC Sources - Operating," declaring EDG 2-3 inoperable.

G. Safety System Responses

None.

III. Cause of the Problem

The EDG 2-3 FOBP seized because the vendor-recommended drive belt tension caused excessive side loading and shaft skewing. The drive belt broke because the FOBP seized, preventing sheave rotation, resulting in the drive belt snapping during coast-down of EDG 2-3 following surveillance testing.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Diablo Canyon Power Plant, Unit 2	05000-323	2012	- 001	- 00	4 OF 4

NARRATIVE

IV. Assessment of Safety Consequences

PG&E's quantitative risk analysis for the 18 days between the time EDG 2-3 was last successfully run on August 3, 2012, and the time when EDG 2-3 was declared operable on August 21, 2012, after replacing the FOBP and its drive belt, concluded that the incremental conditional core damage probability was less than the 1.0E-06 risk significance threshold. This event was a Safety System Functional Failure, but it is not considered risk significant and did not adversely affect the health and safety of the public.

V. Corrective Actions

A. Immediate Corrective Actions

On August 20, 2012, DCPP Maintenance personnel replaced the FOBP and its drive belt.

B. Other Corrective Actions

1) DCPP will reduce the EDG 2-3 drive belt tension specification in procedure MP M-21.7B, "Diesel Engine 2-3 Fuel Oil Booster Pump," to a lower vendor-approved deflection force value.

2) DCPP will establish a periodic replacement strategy for the FOBP.

VI. Additional Information

A. Failed Components

1) The EDG 2-3 FOBP.
2) The EDG 2-3 FOBP drive belt.

B. Previous Similar Events

None.