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SUBJECT: Special rept 99-03:on 990227 failure of EDG 1-1 to stabilize at 4160 +240/-375 volts within 13 seconds,occurred.Cause not determined."Field Flash Cutout Relay" (K3-11) was replaced & diesel subsequently tested satisfactorily.

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March 26,1999

PG&E Letter DCL-99-043

U.S. Nuclear Regulatory Commission
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Docket No 50-275, OL-DPR-80
Diablo Canyon Unit 1
Special Report 99-03, Emergency Diesel Generator 1-1 Valid Failure

Dear Commissioners and Staff:

Pursuant to the special reporting requirements of Diablo Canyon Power Plant Technical Specification (TS) 4.8.1.1.4, and NRC Regulatory Guide (RG) 1.108, Revision 1, PG&E is submitting this special report regarding failure of Emergency Diesel Generator (EDG) 1-1 to stabilize at 4160 +240/-375 volts within 13 seconds. On February 27, 1999, EDG 1-1 voltage took 20.4 seconds to stabilize.

Using the guidance of RG 1.108, Sections B and C.2.e, this event is considered to be a valid failure. Since Unit 1 was in Mode 6 (Refueling) at the time, and EDG 1-1 was returned to operable status prior to entry into Mode 4 (Hot Shutdown), the requirements of TS 3.8.1.1 were satisfied.

In accordance with RG 1.108, Section C.3.b, the following information is provided:

1. Diesel generator involved: EDG 1-1

2. Number of valid failures in last 100 EDG 1-1 valid tests: 3

3. Cause of failure: Based upon available evidence, the root cause could not be determined. PG&E inspected the components in the circuit. Temporary diagnostic instruments are installed to monitor the generator field flash and excitation circuitry during each start, until a cause of the failure is determined, or the completion of 10 additional monitored EDG 1-1 starts.

4. Corrective measures taken:

   a) Immediate corrective action: As a prudent measure, the "Field Flash Cutout Relay" (K3-11) was replaced and the diesel subsequently tested satisfactorily. The K3-11 relay was bench tested but found to operate satisfactory. Also, the voltage regulator control card was replaced and has been sent to the manufacturer for diagnostic testing.

b) To prevent recurrence: Until a cause is identified, no additional corrective actions are planned.

5. Length of Time the EDG was unavailable: At the time of the failure, Unit 1 was in Mode 6 with EDGs 1-2 and 1-3 operable. Therefore, EDG 1-1 was not required to be operable. EDG 1-1 was returned to operable status prior to Unit 1 entering Mode 4.

6. Current surveillance test interval: 31 days

7. Confirmation of proper test interval: After the failure on February 27, 1999, accelerated testing was implemented as required by TS due to exceeding 1 failure in the last 20 tests. Since the failure, EDG 1-1 has successfully completed 23 timed starts, including 9 valid tests. Currently, the total number of valid failures in the last 100 valid tests for EDG 1-1 is 3, and the total number of valid failures in the last 20 valid tests for EDG 1-1 is 1. Therefore, the current 31 day test interval is in compliance with the schedule of TS Table 4.8-1 and an accelerated testing schedule is no longer required.

The enclosure provides additional information regarding the investigative actions and safety significance for this event.

This event was not considered risk significant and could not have adversely affected the health and safety of the public.

Sincerely,

D. Kirsch for D. Oatley

David H. Oatley

cc: Steven D. Bloom
Ellis W. Merschoff
David L. Proulx
Diablo Distribution
INPO

Enclosure

LMP/2245/Q0012109

SPECIAL REPORT 99-03
EMERGENCY DIESEL GENERATOR 1-1 VALID FAILURE

I. Plant Conditions

Unit 1 was in Mode 6 (Refueling).

II. Description of Event

A. Summary

In accordance with the requirements of Diablo Canyon Power Plant Technical Specification (TS) 6.9.2, TS 4.8.1.1.4, and Revision 1 to NRC Regulatory Guide (RG) 1.108, this special report is submitted regarding failure of Emergency Diesel Generator (EDG) 1-1 to stabilize at 4160 +240/-375 volts within 13 seconds. On February 27, 1999, EDG 1-1 voltage took 20.4 seconds to stabilize.

Using the guidance of RG 1.108, Sections B and C.2.e, this event is considered to be a valid failure. During this event, the other two EDGs were operable if called upon in the event of an actual emergency. The TS do not contain EDG limiting conditions for operation during Mode 6; however, plant policy is to maintain two available diesels, which was satisfied at all times.

B. Background

TS 4.8.1.1.2 is applicable in Modes 1 (Power Operation), 2 (Startup), 3 (Hot Standby), and 4 (Hot Shutdown), and includes requirements to demonstrate the EDG is operable by verifying the EDG starts from standby condition and accelerates to at least 900 rpm in less than or equal to 10 seconds. The TS also require generator voltage and frequency to be 4160 + 240/-375 volts and 60 +/- 1.2 Hz within 13 seconds after the start signal.

Surveillance Test Procedure (STP) M-9A, "Diesel Engine Generator Routine Surveillance Test," is performed monthly to fulfill TS 4.8.1.1.2.a.

STP M-9X, "Diesel Generator Operability Verification," is performed to verify operability of an EDG pursuant to TS 3.8.1.1 if one or more EDGs become inoperable for a cause other than preventive maintenance.

STP M-81A, "Diesel Engine Generator Inspection," is performed each refueling to fulfill TS 4.8.1.1.2.b.1).

On August 31, 1998, STP M-9A was performed on EDG 1-1. The results of the test were satisfactory except 4160 +240/-375 volts was achieved in 14.7 seconds instead of within 13 seconds, as required by TS. Three trouble-shooting starts did not identify a cause, until on September 18, 1998, EDG 1-1 failed a troubleshooting test when 4160 +240/-375 volts were achieved in 19 seconds instead of 13 seconds. Source diagnostics revealed that the relay that energizes to de-energize the field flash relay (K3) was delayed. The K3 relay was removed and found to have a loose lug on one of the

terminals to the relay coil. The relay was replaced and all terminals verified tight. Additional discussion of this failure is included in Licensee Event Report (LER) 1-1998-012-00, "Technical Specification 3.8.1.1 Action b., Not Met Due to a Loose Lug on a Relay and Special Report 98-02, Emergency Diesel Generator 1-1 Valid Failure" dated September 30, 1998.

C. Event Description

On February 27, 1999, at 2006 PST, a start for STP M-81A was performed on EDG 1-1. The results of the test were satisfactory except 4160 +240/-375 volts were achieved in 20.4 seconds instead of within 13 seconds.

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

None.

E. Dates and Approximate Times for Major Occurrences

1. March 27, 1999, at 2006 PST: EDG 1-1 failed STP M-81A when stable voltage was achieved in 20.4 seconds instead of within 13 seconds.

F. Other Systems or Secondary Functions Affected

None.

G. Method of Discovery

Plant personnel identified the problem during the performance of STP M-81A.

H. Operator Actions

None.

I. Safety System Responses

None.

III. Cause of the Event

A. Immediate Cause

PG&E has not determined an immediate cause of this event.

B. Root Cause

PG&E is conducting a root cause analysis. Investigations have centered around the field flash and excitation circuitry, but inspections and tests have not identified any deficiencies. Temporary diagnostic instruments have been installed to capture

generator field flash and excitation circuitry data during the 23 timed starts since the failure. All subsequent starts have been within specifications.

EDG 1-1 test data from the temporary instruments was compared to data from EDG 1-2, with no unusual differences noted.

The cable terminations for the field flash DC power supply splices, terminations, and fuses were inspected. The rectifier diodes, zener diode CR57, and motor operated potentiometer were checked and found satisfactory.

At the generator, the field brushes were inspected and verified to be seated correctly and the spring tension acceptable. Slip rings were cleaned. The generator output potential transformer and fuses were inspected. Contact resistance to the fuse holder and external wiring was checked and verified acceptable.

The voltage regulator control card was replaced and has been sent to the manufacturer for diagnostic testing.

The temporary diagnostic instruments will remain installed to monitor the generator field flash and excitation circuitry during each start, until a cause of the failure is determined, or the completion of 10 additional monitored EDG 1-1 starts.

C. Vendor and Industry Operating Experience

The ALCO owners group was contacted and the cause of a similar failure was evaluated. A diesel controls subgroup has also been contacted but no similar failures have been reported.

D. Nuclear Plant Reliability Data System (NPRDS/EPIX)

INPO's NPRDS and EPIX databases have been searched for similar events, but no relevant information has been found.

IV. Analysis of the Event

Safety-related (Class 1E) electrical loads are supplied from three 4160 V vital buses (F, G, and H) for each unit. Each vital bus can be supplied from the 500 kV switchyard, the 230 kV switchyard, the main generator, or the EDGs. The EDGs can provide power for engineered safeguards (Class 1E) motors and loads used for emergency core cooling, reactor shutdown, and other vital safety functions when the main generator and offsite power sources are not available in the event of a loss-of-offsite power or other design basis events.

EDGs 1-2 and 1-3 were available to provide power to the other two Unit 1 vital 4160 V buses during the time that EDG 1-1 was inoperable. Both prior to and subsequent to this event, EDGs 1-2 and 1-3 were successfully tested in accordance with either STP M-9X, or STP M-9A.

Therefore, this event was not considered risk significant and could not have adversely affected the health and safety of the public.

V. Corrective Actions

A. Immediate Corrective Actions

The "Field Flash Cutout Relay" (K3-11) was replaced and the diesel subsequently tested satisfactorily. The K3-11 relay was bench tested but found to operate satisfactory. The voltage regulator control card was replaced as a prudent measure, and has been sent to the manufacturer for diagnostic testing.

B. Corrective Actions to Prevent Recurrence

Until a cause is identified, no additional corrective actions are planned.

VI. Additional Information

A. Failed Components

None.

B. Previous Similar Events

LER 1-1998-012-00 describes two similar failures. The immediate cause was determined to be a loose terminal lug on the field flash cutout relay (K3) coil which caused intermittent electrical contact.