



**Pacific Gas and
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July 27, 2007

PG&E Letter DCL-07-076

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

Docket No. 50-275, OL-DPR-80
Diablo Canyon Unit 1
Licensee Event Report 1-2007-003-00
Emergency Diesel Generator Actuation Due To A Transient Undervoltage
Condition

Dear Commissioners and Staff:

In accordance with 10 CFR 50.73 (a)(2)(iv)(A) Pacific Gas and Electric Company is submitting the enclosed Licensee Event Report regarding an emergency diesel generator actuation due to a transient undervoltage condition. This event was reported under Emergency Notification System report Event Number 43393 in accordance with 10 CFR 50.72 (b)(3)(iv)(A) on May 29, 2007.

This event did not adversely affect the health and safety of the public. There are no new or revised regulatory commitments in this report.

Sincerely,


James R. Becker

swh/2246/A0699162

Enclosure

cc/enc: Terry W. Jackson, NRC Senior Resident Inspector
Bruce S. Mallett, NRC Region IV
Alan B. Wang, NRR Project Manager
Diablo Distribution
INPO

A member of the STARS (Strategic Teaming and Resource Sharing) Alliance
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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: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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 Unit 1	2. DOCKET NUMBER 05000275	3. PAGE 1 OF 6
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4. TITLE
Emergency Diesel Generator Actuation Due To A Transient Undervoltage Condition

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
05	28	2007	2007	- 003 -	00	07	27	2007	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: <i>(Check all that apply)</i>				
10. POWER LEVEL 8	<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 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 checked="" 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 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 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 Lawrence M. Parker – Senior Regulatory Services Engineer	TELEPHONE NUMBER (Include Area Code) (805) 545-3386
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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
				No					

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
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ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On May 28, 2007, at 2250 PDT, with Unit 1 at approximately 8 percent power, preparations were being made to parallel the Main Generator to the grid. All 12kV and 4160V electrical busses had been transferred to the Startup-Standby power supply (230kV System). Operations started Circulating Water Pump 1-2, a large 12kV motor. Starting this motor caused a transient voltage dip in the Startup Standby System voltage. The voltage dip duration was sufficient to time-out the undervoltage diesel generator start time delay relay on the 4160V Vital Bus 'G,' causing a start of the associated Emergency Diesel Generator (DG) 1-2. The 4160V Vital Bus 'G' continued to be powered by the Startup-Standby power source; loads were not transferred and DG 1-2 remained in operation unloaded. DG 1-2 was verified not to be required and returned to its normal standby condition.

On May 29, 2007, at 0501 PDT, an eight-hour nonemergency report was made pursuant to 10 CFR 50.72 (b)(3)(iv)(A) via the Event Notification System (ENS Number 43393).

Corrective actions to prevent recurrence include incorporation of precautions in plant operating procedures to minimize the transient voltage effects due to the start of large motors.

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TEXT

I. Plant Conditions

The Pacific Gas and Electric Company's (PG&E) Diablo Canyon Power Plant Unit 1 was in Mode 1 (Power Operation) at approximately 8 percent reactor power prior to the event.

II. Description of Problem

A. Background

The circulating water system [KE] provides a continuous ocean water cooling supply to the main condenser [COND], condensate cooler [CLR], service water cooling system [KG], and intake cooling system [KE]. Each unit has two single-stage circulating water pumps (CWPs). The CWPs are nominal 12kV, 13,000 horsepower motors and can derive their power from the 230kV Startup-Standby System [EA] or the Unit Auxiliary Power System to their respective nonvital 12kV buses. Each unit has two nonvital 12kV Buses; nonvital Bus D provides power to CWP 1-1, Reactor Coolant Pumps (RCPs) 1-2 and 1-4, and nonvital Bus E provides power to CWP 1-2, RCPs 1-1 and 1-3.

Each unit has three 4160V vital buses that can be powered from the Startup-Standby, Unit Auxiliary, or emergency diesel generators [DG] [EK]. Should a sustained low voltage condition be experienced on any of these buses, undervoltage relays will initiate a DG start signal and if undervoltage is of sufficient magnitude/duration, the bus will separate from the offsite power source and transfer to the DG for subsequent loading.

Three undervoltage relays are provided on each 4160 Class 1E vital bus for detecting sustained degraded voltage condition or a loss of bus voltage. A relay will generate a loss of power (LOP) signal (first level undervoltage relay (FLUR) setpoint) if the voltage is below 75 percent for a short time.

The second level undervoltage relay (SLUR) actuates at approximately 3785V or below, approximately 91 percent, but above the setpoints of the FLURs, the following SLUR actions occur automatically:

- (1) After a less than or equal to 10 second time delay, the respective diesel generators will start.
- (2) After a less than or equal to 20 second time delay, if the undervoltage condition persists, the circuit breakers for all loads to

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TEXT

the respective vital 4160V buses, except the 4160-480V load center transformer, are opened and sequentially loaded on the DG.

B. Event Description

On May 28, 2007, at 2250 PDT, with Unit 1 at approximately 8 percent power, preparations were being made to parallel the Main Generator to the electrical transmission grid. All 12kV and 4160V electrical busses had been transferred to the Startup-Standby power supply (230kV System). Operations started CWP 1-2, a 13,000 horsepower 12kV motor. Since the 12kV System feeds the 4kV System when aligned to Startup, the resultant voltage dip propagated throughout the Startup Standby System. The voltage transient duration of approximately 8 seconds was sufficient to time out the SLUR on the 4160V Vital Bus 'G,' causing a start of that bus's DG 1-2. The 4160V Vital Bus 'G' voltage recovered to above the SLUR voltage setpoint prior to timing out the load shed timer. Thus the bus continued to be powered by the Startup-Standby power source; loads were not transferred and DG 1-2 remained in operation unloaded.

Immediately after the component actuation, DG 1-2 was verified not to be required to respond to the voltage transient event, was shut down, and returned to its normal standby condition.

On May 29, 2007, at 0501 PDT, an eight-hour nonemergency report was made using the Event Notification System (ENS Number 43393) pursuant to 10 CFR 50.72 (b)(3)(iv)(A).

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

None.

D. Other Systems or Secondary Functions Affected

None.

E. Method of Discovery

The automatic actuations were immediately known to licensed plant operators in the control room by alarms and indications.

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F. Operator Actions

Plant operators responded to alarms and indications provided in the control room, confirmed that continued DG 1-2 operation was not required, shut down the DG, and returned it to its standby status.

G. Safety System Responses

DG 1-2 automatically started when a transient undervoltage condition was sensed on the 4160V Vital Bus 'G', causing DG 1-2 to start, but did not cause it to load. Since the 4160V Vital Bus 'G' continued to be powered by the Startup-Standby power source, loads were not transferred to DG 1-2. The magnitude/duration of the voltage transient on the 4160V Vital Bus 'F' and 4160V Vital Bus 'H' was similar, but due to the relay settings being closer to 10 seconds, these relays did not time out and the DG 1-1 and DG 1-3 did not start.

III. Cause of the Problem

A. Immediate Cause

The duration of a 4kV undervoltage transient resulting from the start of a 13,000 horsepower CWP pump motor, while both the associated 12kV bus and the 4kV Vital Bus G were aligned to the Startup offsite power source, exceeded the setpoint of the second level undervoltage DG start time delay relay, starting DG 1-2.

B. Root Cause

Plant procedures did not clearly identify precautions necessary for the subject plant configuration to minimize voltage transient conditions that could result in an inadvertent DG start.

C. Contributing Causes

Prior engineering recommendations were not captured in plant procedures.

IV. Assessment of Safety Consequences

There were no actual safety consequences involved in this event since the safety-related plant electrical systems responded as designed. All vital

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TEXT

equipment remained aligned to the Startup-Standby power source for the duration of the event.

Final Safety Analysis Report (FSAR) Update, Section 15.2.9, "Loss of Offsite Power to the Station Auxiliaries," previously analyzed the total loss of offsite power, and bounds the transient undervoltage conditioned experienced in this event. The FSAR Update concluded that "for the loss of offsite power to station auxiliaries event, all safety criteria are met."

This condition is not considered a Safety System Functional Failure as the transient undervoltage condition is a previously analyzed condition and anticipated operational occurrence that does not create a significant condition adverse to safety. The lowest voltage experienced on 4160V Vital Bus 'G' was seen as approximately 85.6 percent; the FLUR setpoint is at 75 percent and the SLUR setpoint is at approximately 91 percent. The setpoints for the FLURs and SLURs are based on ensuring sufficient margin is available so that loads are not stripped from the bus and reloaded on the DGs. In addition, The SLUR setpoints have been selected to ensure that the technical specification allowable values are not exceeded due to normal instrument drift. The methodology used provides margin by accounting for inaccuracies, biases, and uncertainties of components including calibration equipment.

Therefore, the event is not considered risk significant and it did not adversely affect the health and safety of the public.

V. Corrective Actions

A. Immediate Corrective Actions

Following confirmation that the DG start was due to the CWP start voltage transient, DG 1-2 was shut down and returned to its standby status.

B. Corrective Actions to Prevent Recurrence

1. PG&E revised the CWP starting procedure OP E-4:I to add a precaution to minimize the voltage transient condition due to the large motor start.
2. PG&E will revise the RCP starting procedure OP A-6:I to add a precaution to minimize the voltage transient condition due to the large motor start.

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TEXT

VI. Additional Information

A. Failed Components

None.

B. Previous Similar Events

None.