

# LICENSEE EVENT REPORT (LER)

<b>FACILITY NAME (1)</b> Diablo Canyon Unit 1	<b>DOCKET NUMBER (2)</b> 0 5 0 0 0 2 7 5	<b>PAGE (3)</b> 1 OF 6
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**TITLE (4)**  
Unplanned Start of Diesel Generator 1-1 Due to a 4160 V Bus H Startup Feeder Phase Potential Transformer Opened Fuse

EVENT DATE (5)				LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)									
MON	DAY	YR	YR	SEQUENTIAL NUMBER	REVISION NUMBER	MON	DAY	YR	FACILITY NAME					DOCKET NUMBER						
05	20	97	97	- 0 1 0 -	0 0	06	19	97												

<b>OPERATING MODE (9)</b> 5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11)  <input checked="" type="checkbox"/> 10 CFR 50.73(a)(2)(iv) <input type="checkbox"/> OTHER (SPECIFY IN ABSTRACT BELOW AND IN TEXT, NRC FORM 366A)
<b>POWER LEVEL (10)</b>	
0 0 0	

**LICENSEE CONTACT FOR THIS LER (12)**

<b>Vickie A. Backman - Senior Regulatory Services Engineer</b>	<b>TELEPHONE NUMBER</b>
	AREA CODE: 805    545-4289

**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS

<b>SUPPLEMENTAL REPORT EXPECTED (14)</b> <input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input type="checkbox"/> NO	<b>EXPECTED SUBMISSION DATE (15)</b>	MON	DAY	YR
		11	03	97	

**ABSTRACT (16)**

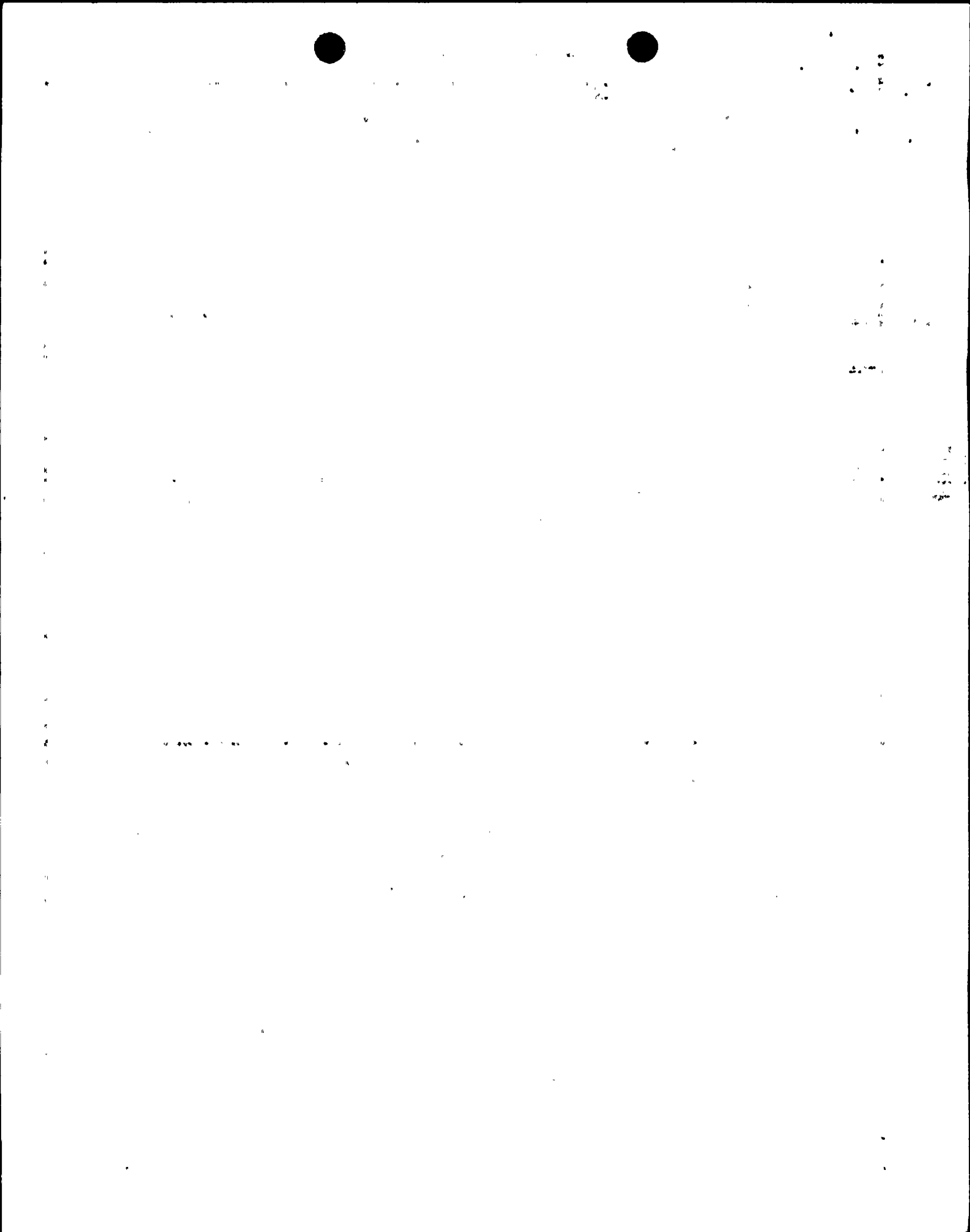
On May 20, 1997, at 2131 PDT, with Unit 1 in Mode 5 (Cold Shutdown), Diesel Generator (DG) 1-1 automatically started due to an undervoltage relay actuation after a fuse opened on the primary side of the 4160 V Bus H startup feeder potential transformer (PT). This event constitutes an engineered safety features actuation. A 4-hour, non-emergency report was made to the NRC in accordance with 10 CFR 50.72 (b)(2)(ii) on May 21, 1997, at 0021 PDT.

On May 20, 1997, at 2144 PDT, DG 1-1 was shut down and returned to the automatic mode of operation.

The cause of fuse failure is not known. This LER will be revised after a more in-depth analysis of the failure is completed.

Primary side PT fuses were replaced on all 3 vital busses for the Unit 1 startup and auxiliary transformer feeds. Fuses on the primary side of the Unit 2 startup and auxiliary power PTs will be checked and replaced if necessary. Fuse and PT circuitry analyses will be performed to determine the cause of fuse failure. Operators will review the causes, contributing factors, corrective actions, and lessons learned from this event.

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TEXT

I. Plant Conditions

Unit 1 was shut down in Mode 5 (Cold Shutdown) with an average plant temperature of 115°F and at atmospheric pressure. At the time of the event, switching was in progress to restore Startup Transformer 1-2.

II. Description of Problem

A. Summary

On May 20, 1997, at 2131 PDT, with Unit 1 in Mode 5, Diesel Generator (DG) (EK)(DG) 1-1 automatically started due to an undervoltage relay (UV) (EA)(27) actuation after a fuse opened on the 4160 V Bus H startup feeder (EA)(BU) potential transformer (PT) (EC)(XPT). This event constitutes an engineered safety features (ESF) actuation. A 4-hour, non-emergency report was made to the NRC in accordance with 10 CFR 50.72 (b)(2)(ii) on May 21, 1997, at 0021 PDT.

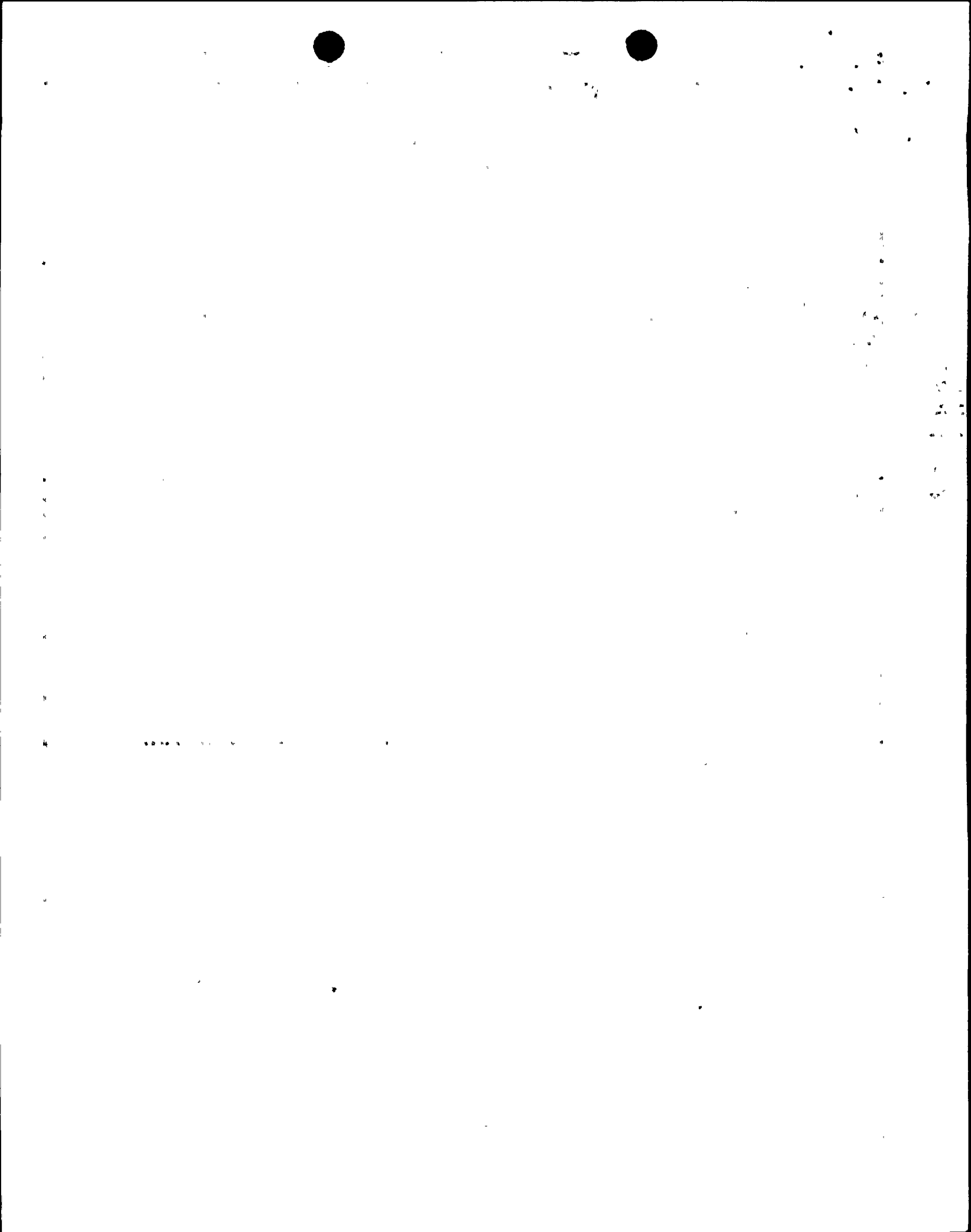
B. Background

UV relay device 27HHU, is powered from the vital 4160 V Bus H through the 4200/120 V startup feeder PT and a relay sensing signal cutout knife switch. The 27HHU UV contact (relay terminals 1 and 10) picks up 2 Auxiliary Relays, 27XHHB2 and 27YHHB2. These 2 auxiliary relays provide start signals to DG 1-1.

The DG autostart feature from the bus undervoltage protection scheme is enabled after energizing the startup feeder by closing the 27HHU terminal 10 knife switch in accordance with Operating Procedure (OP) OP J-2:II, "Startup Bank Return to Service."

C. Event Description

On May 20, 1997, during Unit 1 eighth refueling outage, operators were returning Startup Transformer 1-2 to service in accordance with OP J-2:II. After energizing the startup transformer from the control room, operators went to the 4160 V bus rooms to close the terminal 10 knife switch on Relay Devices 27HFU (vital Bus F), 27HGU (vital Bus G), and 27HHU (vital Bus H). The knife switches for buses F and G were closed without incident.



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TEXT

Just before closing the knife switch for Bus H, the operators in the control room and at the Bus H startup breaker cubicle saw the PT B-C phase light at the Bus H drawer and the startup PT light in the control room flickering (lighting intermittently). The operators replaced bulbs at both locations, but neither of the indication lights came on. The operators concluded that the remaining knife switch for Bus H could be closed because they had just performed the same steps to energize vital Busses F and G. However, they had not assimilated the lack of B-C potential indication as a precursor to bus undervoltage protective relaying activation.

On May 20, 1997, at 2131 PDT, the operators closed the knife switch on Relay Device 27HHU. The relay device sensed a no voltage condition because of the opened fuse. This enabled Auxiliary Relays 27XHHB2 and 27YHHB2, which started DG 1-1.

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

None.

**E. Dates and Approximate Times for Major Occurrences**

1. May 20, 1997, 2131 PDT: Event date/discovery date. Unplanned start of DG 1-1.
2. May 20, 1997, 2144 PDT: DG 1-1 was shut down and returned to the automatic mode of operation.
3. May 21, 1997, 0021 PDT: A 4-hour, non-emergency report was made to the NRC, in accordance with 10 CFR 50.72 (b)(2)(ii).

**F. Other Systems or Secondary Functions Affected**

None.

**G. Method of Discovery**

The event was immediately apparent to the operators due to alarms and indications received in the control room.



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TEXT

H. Operator Actions

DG 1-1 was shut down, the knife switch on Relay Device 27HHU reopened, and the DG returned to the automatic mode of operation.

I. Safety System Responses

DG 1-1 started, but did not connect to its associated 4160 V bus because auxiliary transformer power was available.

III. Cause of the Problem

A. Immediate Cause

DG 1-1 started because UV Relay Device 27HHU actuated due to an opened fuse on the 4160 V Bus H startup feeder PT.

B. Root Cause

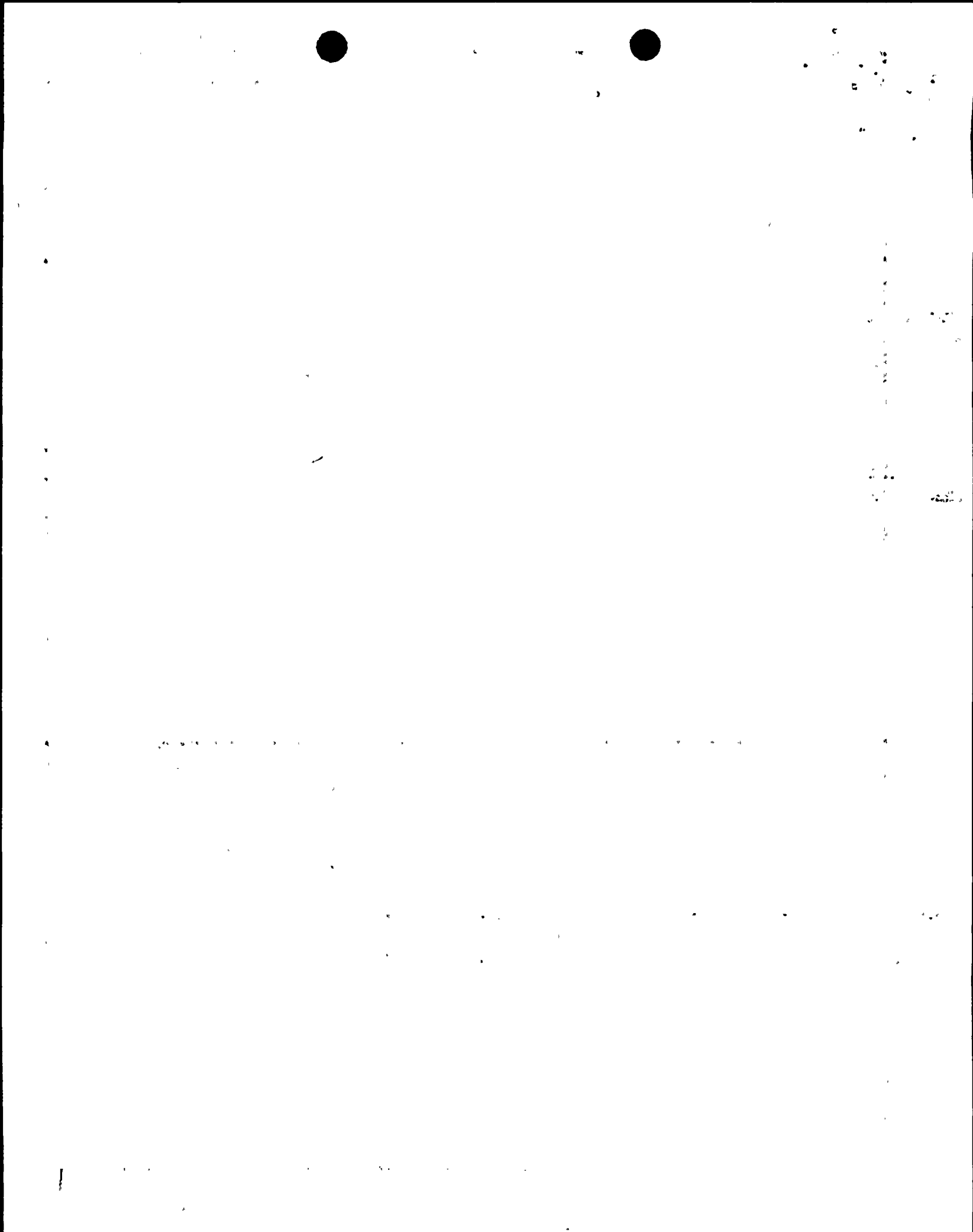
The cause for the opened fuse has not been determined and is complicated because the fuse was inadvertently discarded. Although the fuse is unavailable for direct analysis, PG&E is investigating several possible failure mechanisms. See Section V.B., Corrective Actions to Prevent Recurrence.

C. Contributory Causes

Plant operators did not assimilate the lack of B-C potential indication as a precursor to bus undervoltage protective relaying activation before closing the knife switch on Relay Device 27HHU.

IV. Analysis of the Event

Since all equipment performed as designed during the event, the inadvertent actuation of the DG ESF component did not adversely affect the health and safety of the public.





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TEXT

V. Corrective Actions

A. Immediate Corrective Actions

1. The fuse was replaced and tested satisfactorily.
2. Primary side PT fuses were replaced on all vital busses for the Unit 1 startup and auxiliary transformer feeds.

B. Corrective Actions to Prevent Recurrence

The fuses on the primary side of the vital Unit 2 startup and auxiliary transformer power PTs will be checked and replaced, as necessary, during the next scheduled refueling outage. PG&E believes this action is timely because there is no history of fuses opening on the primary side of the startup and auxiliary power PTs. In addition, should a fuse open, it would not prevent the performance of any ESF function.

An analysis of the PT circuitry design (primary and secondary) will be performed to assess the adequacy of fuse design and potential failure modes.

An analysis will be performed on the fuses removed from the primary side of the other Unit 1 vital startup and auxiliary PTs that have similar date codes and have been installed for approximately the same duration. The analysis will also compare the previously installed fuses with new fuses from the warehouse.

Operators will review the cause, contributing factors, corrective actions, and lessons learned from this event.

VI. Additional Information

A. Failed Components

None

B. Previous LERs on Similar Problems

LER 1-97-009-00, dated June 6, 1997, identified an unplanned start of DG 1-1. The cause of that event was attributed to personnel error and



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TEXT

inadequate work controls. The corrective actions focused on enhancing the clearance process, and therefore would not have prevented the event discussed in this report.

LER 1-94-011-00, dated May 10, 1994, identified an unplanned start of DG 1-2. The cause of that event was attributed to personnel error in that an operator was not aware that ac potential circuits could be inadvertently shorted together while attempting to replace an indicating light bulb. The corrective action for this event included issuing an Electrical Maintenance Bulletin and evaluating the second level undervoltage sensing scheme. Neither of these actions would have prevented this event.

