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ACCESSION NBR:9104150273 DOC.DATE: 91/04/08 NOTARIZED: NO DOCKET #
FACIL:50-275 Diablo Canyon Nuclear Power Plant, Unit 1, Pacific Ga 05000275
AUTH.NAME AUTHOR AFFILIATION
HUG,M.T. Portland General Electric Co.
SHIFFER,J.D. Portland General Electric Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 91-004-00:on 910307,loss of offsite power occurred when mobile crane boom was to close to power lines.Caused by personnel error.Offsite power restored & investigation team investigate problem.W/910408 ltr.

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James D. Shiffer
Senior Vice President and
General Manager
Nuclear Power Generation

April 8, 1991

PG&E Letter No. DCL-91-079

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Re: Docket No. 50-275, OL-DPR-80
Diablo Canyon Unit 1
Licensee Event Report 1-91-004-00, Loss of Offsite Power During Refueling Caused by a Crane Due to Personnel Error
Special Report 91-02, Diesel Generator 1-1 Failure to Load Within Technical Specification Limits

Gentlemen:

Pursuant to 10 CFR 50.73(a)(2)(iv), 10 CFR 50.73(a)(2)(v), and Technical Specification (TS) 4.8.1.1.2, PG&E is submitting the enclosed Licensee Event Report (LER) concerning the loss of offsite power to Unit 1 due to personnel error and a Special Report regarding the non-valid failure of emergency Diesel Generator (DG) 1-1. The DG did not load within the 10 seconds required by TS.

Information Regarding LER 1-91-004-00

The event discussed in this LER was also discussed in PG&E's Letter No. DCL-91-049, dated March 7, 1991. Following the event, an Event Investigation Team (EIT) was convened to investigate the causes and possible corrective actions. Not all corrective actions identified by the EIT are included in this LER since the actions are not specifically related to the LER event. An Augmented Inspection Team (AIT) has reviewed the event, and this LER takes into account some of the comments and insights of the AIT. PG&E plans to submit a supplement to this LER following additional identification and finalization of corrective actions. This supplement will include as necessary an evaluation of any formal AIT findings. All corrective actions will be substantially or fully complete prior to PG&E's next refueling outage.

Information Regarding Special Report 91-02

Using the guidance of Regulatory Guide (RG) 1.108, Sections B and C.2.e, the failure of DG 1-1 to load to its vital bus within 10 seconds is considered to be a non-valid failure. The failure to load is discussed in the LER forwarded by this letter. In accordance with RG 1.108, Section C.3.b, the following information is provided:

1. DG involved: DG 1-1

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

IE22
1/1

3. Cause of failure: Unknown.

4. Corrective measures taken:
   a) Immediate Corrective Action: DG 1-1 was declared inoperable and troubleshooting began.
   b) To Prevent Recurrence: No corrective actions to prevent recurrence were identified as the cause could not be identified.

5. Time DG was unavailable: DG 1-1 was declared inoperable at 0839 PST, March 11, 1991, and declared operable at 1750 PST, March 24, 1991, after successful performance of surveillance tests which verified the loading time of the DG. The total time of unavailability of DG 1-1 was 321 hours and 11 minutes.

6. Current surveillance test interval: 31 days

7. Confirmation of proper test interval: The total number of valid failures in the last 100 valid tests for DG 1-1 is 2, and the total number of valid failures in the last 20 valid tests for DG 1-1 is 0; therefore, the 31 day test interval is in compliance with the schedule of TS Table 4.8-1 and an accelerated testing schedule is not required.

These events have in no way effected the health and safety of the public.

Sincerely,

J. D. Shiffer

cc: Ann P. Hodgdon
John B. Martin
Phillip J. Morrill
Paul P. Narbut
Harry Rood
CPUC
Diablo Distribution
INPO

DCl-91-MM-N028
DCl-91-TN-N032

Enclosure

5299S/0085K/ALN/2246

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
DIABLO CANYON UNIT 1	0 5 0 0 0 2 7 5	1 OF 12

TITLE (4) LOSS OF OFFSITE POWER DURING REFUELING CAUSED BY A CRANE DUE TO PERSONNEL ERROR

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 NAMES	DOCKET NUMBER (S)
03	07	91	91	- 0 0 4 -	0 0	04	08	91		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	6
POWER LEVEL (10)	0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11)

X 10 CFR 50.73(a)(2)(iv) and 50.73(a)(2)(v)

OTHER -

(Specify in Abstract below and in text, NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER AREA CODE	TELEPHONE NUMBER
MARTIN T. HUG, SENIOR REGULATORY COMPLIANCE ENGINEER	805	545-4005

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
| X | YES (if yes, complete EXPECTED SUBMISSION DATE)	| | NO		06	06	91

ABSTRACT (16)

On March 7, 1991, at 0807 PST, with Unit 1 in Mode 6 (Refueling) at 0 percent power, a loss of offsite power to Unit 1 occurred when a mobile crane boom came too close to the 500 kV power lines. The 500 kV line arced to ground through the crane boom, and caused the loss of offsite power. The emergency diesel generators started and loaded to the vital busses. An Unusual Event was declared at 0830 PST, March 7, 1991. A one-hour emergency report was made in accordance with 10 CFR 50.72(a)(3) at 0900 PST. A four-hour non-emergency report was made in accordance with 10 CFR 50.72(b)(2)(ii) and (b)(2)(iii) on March 7, 1991, at 1011 PST, due to the actuation of engineered safety features and momentary loss of RHR, respectively. The special report is being submitted as the result of the non-valid failure of DG 1-1 that occurred during the event.

The root cause was determined to be personnel error by the crane operator and the foreman in implementation of PG&E's accident prevention rules. Contributory causes included inadequate implementation of the recommendations made in response to NUREG-1410 regarding the loss of offsite power at Vogtle, inadequate training concerning electrical safety issues for non-electrical workers, and work practices not requiring a clearance for crane operation in the area of high voltage lines and transformers.

Following the event, the plant manager stopped all non-critical work for 24 hours to allow personnel to review remaining outage work for safety considerations. Corrective actions to prevent recurrence include training applicable personnel on electrical safety issues, posting warnings signs around high voltage lines and transformers within the plant protected area, issuing a memorandum stressing the importance of tailboards, and revising the operating experience assessment process to assure more timely and thorough response. A supplemental report will be issued after review of additional corrective actions.

I. Plant Conditions

Unit 1 was in Mode 6 (Refueling) at 0 percent power for the Unit 1 fourth refueling outage. Offsite electrical power was being supplied to the unit from the 500 kV system (FK). The Unit 1 230 kV startup power system (FK) was cleared for maintenance, and all three emergency diesel generators (DGs) (EK)(DG) were available. This electrical configuration was planned as part of the AC power source management during plant outage conditions in response to NUREG-1410, "Loss of Vital AC Power and the Residual Heat Removal System During Mid-Loop Operations at Vogtle Unit 1 on March 20, 1990."

II. Description of Event

A. Event:

On March 7, 1991, a mobile crane was being used to lift a relief valve (SB)(RV) into position for installation onto a main steam (SB) line outside of containment (NH). The crane was grounded to the main transformer (FK)(XFMR) grounding pad.

At 0807 PST, the boom of the mobile crane came too close to one phase of the 500 kV system and caused a flashover from the conductor. This caused the 500 kV system power circuit breaker (PCB) PCB-532 (FK)(52) to open and isolate offsite power from Unit 1. The 230 kV startup power system had been cleared for maintenance and was not available. The crane operator and other work crew personnel were not injured during the event.

At the time of the event, refueling was in progress with five fuel assemblies (AC) remaining to be reloaded to complete the reload sequence. One new fuel assembly was located in the manipulator crane mast (DF)(CRN) in the full-up position. The manipulator crane was positioned over the core (AC). Another new fuel assembly was located in the upender (DF) inside containment in the horizontal position. The other three assemblies were in the spent fuel pool.

At 0807 PST, all three DGs automatically started, supplying power to their respective 4 kV vital busses (EB). The senior control operator verified that an auxiliary salt water (ASW) pump (BS)(P), two component cooling water (CCW) pumps (BI)(P), all containment fan cooling units (CFCUs) (BK)(FCU), and one centrifugal charging pump (CCP) (BQ)(P) were running. At 0808 PST, a Unit 1 control operator manually started Residual Heat Removal (RHR) Pump (BP)(P) 1-2. An announcement was made over the public address system (PA) to suspend fuel movement due to the loss of offsite power; however, fuel movement had already been suspended due to loss of normal lighting (FF) in the Unit 1 fuel handling building (FHB)(ND) and containment building.

At 0820 PST, the senior reactor operator in charge of refueling determined, after conversations with control room personnel, that the loss of power would continue for some time. He directed that the manipulator crane be manually moved away from the core region.

In accordance with plant procedures, the Shift Supervisor declared an Unusual Event at 0830 PST due to the loss of offsite power. Unit 2 was not affected by the event, and all safety systems for Unit 2 remained operable.

The San Luis Obispo County Sheriff's office Watch Commander was notified at 0837 PST, March 7, 1991. The one-hour emergency report was made to the NRC in accordance with 10 CFR 50.72(a)(3) at 0900 PST. At 1011 PST, a four-hour non-emergency report was made in accordance with 10 CFR 50.72(b)(2)(ii) and 50.72(b)(2)(iii). The four-hour report was made due to the temporary loss of RHR, the starting of the DGs, and the transfer of the control room ventilation system (VI) to Mode 4 (pressurization). The FHB ventilation system (VG) transferred to the iodine removal mode of operation; however, this information was not included in the report.

By 0930 PST, an action plan was developed to restore offsite power to Unit 1. During the development of the action plan, management considered restoration of offsite power from both the 500 and 230 kV systems. Further review determined that the 230 kV startup power system could be more quickly restored by reenergizing the 230 kV switchgear (FK)(SWGR). The switchgear had been cleared the previous day for maintenance and was within a few hours of being returned to service. The decision was made to restore offsite power via the 230 kV startup power system because the condition of the 500 kV line and transformer was unknown, and the operability of the crane was unknown. Since the plant was in a stable condition, and all vital loads were being carried by the DGs, this work was not performed as emergency maintenance.

At 1228 PST, offsite power was restored to the Unit 1 Startup Transformer 1-2 (FK)(XFMR).

At 1252 PST, operators began returning vital busses to startup power and shutting down the DGs. By 1300 PST, all Unit 1 busses were energized from offsite 230 kV startup power system and all DGs were shut down. All busses and electrical equipment were walked down and no abnormalities were noted.

At 1325 PST, March 7, 1991, with offsite electrical power restored to all Unit 1 electrical systems via the 230 kV system and with the emergency DGs shutdown, the Unusual Event was terminated.

At 1600 PST, the plant manager conducted a meeting for all supervisory

personnel, informing them that all non-critical work would be stopped for 24 hours to allow supervisors to review with their personnel any potential safety concerns with remaining outage work.

At 1638 PST, the core reload was resumed. The core reload was completed at 1814 PST, and the core flux mapping was completed at 1940 PST.

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

The 230 kV startup power system was unavailable due to maintenance activities.

C. Dates and Approximate Times for Major Occurrences:

1. March 7, 1991 at 0807 PST: Event/Discovery date - While attempting to position a relief valve, a crane boom causes one phase of the 500 kV line to arc to ground. All offsite power was lost to Unit 1. All 3 DGs auto-started and supplied power to their respective vital busses.

2. March 7, 1991, at 0820 PST: A new fuel assembly suspended over the core in the manipulator crane mast was manually moved to clear the core region.

3. March 7, 1991, at 0830 PST: An Unusual Event was declared due to loss of offsite power.

4. March 7, 1991, at 0900 PST: A 1-hour emergency report was made to the NRC in accordance with 10 CFR 50.72(a)(3).

5. March 7, 1991, at 0930 PST: An action plan for recovery of offsite power was developed.

6. March 7, 1991, at 1011 PST: A 4-hour non-emergency report was made to the NRC in accordance with 10 CFR 50.72(a)(2)(ii) and 50.72(a)(2)(iii).

7. March 7, 1991, at 1325 PST: The Unusual Event was terminated with offsite power restored from the 230 kV startup power system.

D. Other Systems or Secondary Functions Affected:

1. Auxiliary building (NS) fans (VF)(FAN) could not be restarted after the vital busses were reenergized by the DGs.

   An electrical power supply for the auxiliary building ventilation control system (VF) failed after the event. Investigation determined that the voltage regulator (VF)(90) for the power supply and several capacitors (VF)(CAP) had failed. The failed components were replaced, and the loss of power event was simulated. The power supply responded normally.

2. The control room ventilation system shifted to Mode 4 when offsite power was lost. This constituted an engineered safety feature (ESF) actuation.

   At the time of the event, the normal power supply for Radiation Monitor RM-26 (IL)(DET) was out of service for maintenance, and the monitor was being powered from its backup power supply. RM-26 monitors radiation levels at the control room ventilation system intake. When power was lost to Unit 1, RM-26 was deenergized until vital power was restored from the DGs. When power was lost to RM-26, it alarmed as designed and initiated the control room ventilation system shift to Mode 4. The equipment functioned as designed.

3. Following the loss of Unit 1 AC power, the Unit 1 control room emergency lighting (FH) failed to function. Lighting was restored when the normal control room lighting distribution panel was cross-connected to the Unit 2 supply. Subsequently, a walkdown of the emergency lighting supply found that the manual transfer switch (FH)(HS) to the emergency lighting dimmer panel was selected to the backup source and not to the emergency inverter (FH)(INVT). The backup source is supplied off of 480 volt bus 12D, which is not powered from the vital bus, and thus was not available during the loss of AC power. The inverter for the DC power supply had previously failed and did not provide power to the control room emergency lighting. Action has been initiated to investigate and resolve this problem.

4. The FHB ventilation system transferred from the normal mode of operation to the iodine removal mode. This constitutes an ESF actuation.

   Radiation Monitor RM-59 (IL)(DET) was powered from Instrument AC panel PY-13 (PAN), which was powered from its back-up transformer (IL)XFMR. When offsite power was lost, the back-up transformer, and subsequently RM-59, lost power. When power was lost to RM-59, it alarmed as designed. The alarm on RM-59

initiated a transfer of the FHB ventilation system to the iodine removal mode. All equipment functioned as designed.

5. DG 1-1 started and loaded to its vital bus. During an NRC inspector's review of the annunciator (IB) printout, the failure of DG 1-1 to load to its vital bus within ten seconds of the event, as required by TS 4.8.1.1.2, was noted. DG 1-1 took approximately 19 seconds to start and load to the bus. This constitutes a non-valid failure of DG 1-1.

   An investigation was conducted to identify the cause of the delay in loading. The investigation did not identify any problems with the DG starting and loading circuitry. The following actions were performed to identify the cause:

   a. Surveillance Test Procedure (STP) M-13H, "4kV Bus H Auto Transfer Timers Setting Verification," was performed in an attempt to recreate the event prior to any maintenance activities. The STP tests the portion of the circuitry responsible for starting and loading the DG. During this test, the auxiliary power feeder breaker is manually opened. During the event, the auxiliary power feeder breaker opened automatically due to the loss of power. The DG loaded to its vital bus within ten seconds. The STP did not identify any problems.

   b. STP M-15, Part B, "Integrated Test of Engineered Safeguards and Diesel Generators," was performed three times. This STP tests the circuitry responsible for starting and loading the DG, and automatically opens the auxiliary power feeder breaker on a safety injection (SI) signal. All portions of the circuitry that actuated during the event, except for the auxiliary breaker opening automatically, were tested during this STP. The DG started and loaded onto its vital bus within ten seconds each time. The STP did not identify a problem with the circuitry. Visicorder traces of the relays in the circuitry were obtained. No anomalies were noted on the traces.

   c. During the first performance of STP M-15, Part B, an inconsistency was noted in the annunciator printout for the sequence of events.

      One inconsistency was the clearing of an undervoltage alarm on one DG prior to the alarm registering. The other inconsistency was that the sequence of events was not printed in chronological order.

      The annunciator printout and system software were reviewed

to determine if a problem existed. The review concluded that no problems existed with the annunciator.

d. The starting circuitry sequence was reviewed. During the event, it was determined that since the load shed relay (27XHHT) (EK)(RLY) was actuated, the first level undervoltage circuitry worked as designed. The problem occurred downstream of the load shed relay. The circuitry subsequently functioned satisfactorily four times, once during performance of STP M-13H and three times during performance of STP M-15, Part B.

The relays and switches in the DG 1-1 feeder breaker closing circuit were reviewed to ascertain if there was proof that they functioned correctly, or if they could have delayed the closing of the DG onto the vital bus. All those relays which could have functioned incorrectly were tested by the STPs performed subsequent to the event and functioned correctly.

e. The loss of offsite power event was reviewed against STP M-15, Part B, to determine differences between the test and the event. The review identified several differences:

1. A 300 MW ground fault occurred during the event. This condition cannot be safely recreated.

2. The 230 kV startup power system was unavailable due to maintenance at the time of the event.

3. The DG started due to a loss of power signal during the event. During STP M-15, Part B, the DGs started as the result of an SI signal. Both the loss of power signal and the SI signal test the same DG start circuitry.

The change analysis did not identify any differences between the loss of offsite power and the performance of STP M-15, Part B, that could be recreated.

Investigation into the problem failed to identify any possible cause for the failure of DG 1-1 to load to its vital bus within ten seconds. The DG 1-1 problem could not be recreated.

E. Method of Discovery:

The loss of offsite power event was immediately apparent to plant operators due to alarms and indications received in the control room and the loss of lighting in Unit 1.

F. Operators Actions:

1. Operations personnel suspended fuel movement in the FHB and containment.

2. Equipment designed to auto-start was verified to be running.

3. RHR Pump 1-2 was manually restarted. The pump is not intended to automatically restart after vital bus transfer in Mode 6.

4. The manipulator crane was manually moved away from the core region.

5. Spent Fuel Pool Cooling Pump (DA)(P) 1-2 was restarted. The pump is not intended to automatically restart after vital bus transfers.

6. Plant busses were reconfigured to restore offsite power from the 230 kV startup power system.

G. Safety System Responses:

1. DGs 1-1, 1-2, and 1-3 started and loaded to supply power to vital busses.

2. ASW Pump 1-2 restarted on bus transfer. ASW Pump 1-1 was cleared for maintenance.

3. All CFCUs auto-started on bus transfer.

4. CCP 1-2 auto-started on bus transfer. CCP 1-1 was cleared for maintenance.

5. CCW Pumps 1-1, 1-2 and 1-3 auto-started on bus transfer.

III. Cause of the Event

A. Immediate Cause:

The immediate cause of the loss of offsite power was the grounding of the 500 kV line through the boom of the mobile crane.

B. Root Cause:

The root cause was determined to be personnel error (cognitive) in that the crane operator and the foreman did not follow the accident prevention rules and did not recognize the electrical safety issues during job planning and execution.

C. Contributory Cause:

The contributory causes were determined to be:

1. Work practices, which require a clearance for crane operation in the area of high voltage lines or transformers, were not followed.

2. The evaluation by PG&E of NRC Information Notice 90-25, "Loss of Vital AC Power With Subsequent Reactor Coolant System Heat-up," and NUREG-1410 and the resulting corrective actions were ineffective in precluding this event. While PG&E had evaluated the events described in these reports, as a result of the method used to prioritize corrective actions identified through PG&E's operating experience assessment program the proposed actions had not yet been presented to management for approval.

3. Communication in the tailboard prior to beginning installation of the relief valve was not adequate to provide necessary job safety information to the foreman or crew.

4. Training was not adequate on electrical safety issues for non-electrical workers.

IV. Analysis of the Event

A. Safety Analysis:

During the event, RHR capability was lost for less than one minute, and the spent fuel pool pumps were inoperable for approximately 23 minutes. One pump was manually restarted. During the time the pumps were not running, the calculated maximum temperature rise was approximately 1.8 degrees Fahrenheit. There was no loss of inventory in the refueling cavity or the spent fuel pool.

In Mode 6, the purpose of the RHR system is to remove decay heat from the fuel assemblies in the reactor vessel (AB)(RPV). The purpose of the spent fuel cooling pumps is to remove decay heat from spent fuel elements.

When the event occurred, all but five fuel assemblies had been loaded into the core. With the RHR and spent fuel cooling pumps inoperable, the water temperature in the refueling cavity would begin to increase approximately 4.6 degrees Fahrenheit per hour. It was determined that, if the water in the refueling cavity was at 90 degrees Fahrenheit initially and if the cycle 5 core had been completely reloaded at the time of the event, it would have taken approximately 26 hours for the water in the refueling cavity to begin to boil. This time conservatively assumes that no heat transfer to the concrete or

to the atmosphere occurs.

If the event had occurred at the beginning of the outage, and the entire cycle 4 core had just been unloaded into the spent fuel pool, the heat input to the water in the pool would have been approximately 12 MW. Assuming the water was initially at 90 degrees Fahrenheit and the pool level was at the 137 foot elevation, it would take approximately 8 hours for the water in the spent fuel pool to begin to boil if all power was lost to the unit. This time conservatively assumes that no heat transfer occurs from the water to the pool liner or the atmosphere.

Had the DGs not started or had they been unavailable, power to the RHR pumps would have had to be supplied through the offsite power system. It took approximately 5 hours to restore offsite power from the 230 kV system. This would provide for restoration of the RHR pumps prior to boiling of the water in the refueling cavity with either the cycle 4 or cycle 5 core in the reactor vessel. If the event had occurred at a time when the 230 kV system could not have been quickly restored, conservative estimates concluded that offsite power from the 500 kV system could have been restored in approximately 4 hours using emergency maintenance procedures. This estimated time includes initial operator response to the event, removing the crane from the vicinity of the 500 kV lines even if the crane had been rendered inoperable by the event, removal of grounds from the line, and switching to restore power. The four hours estimated to restore offsite power, and subsequently RHR, from the 500 kV system is less than the time required to boil the water in the refueling cavity.

Since the water in the reactor cavity or spent fuel pool would not have boiled prior to cooling being restored, and therefore inventory would not have been depleted, the health and safety of the public were not significantly affected by the event.

V. Corrective Actions

A. Immediate Corrective Actions:

1. An Event Investigation Team was convened to investigate the problem.

2. Offsite power was restored via the 230 kV system.

3. All outage work was suspended for a period of 24 hours.

4. A letter from the Senior Vice President and General Manager was issued to all plant personnel emphasizing safety on the job.

B. Corrective Actions to Prevent Recurrence:

1. All appropriate plant and General Construction personnel will be trained on the electrical safety portions of the PG&E accident prevention rules.

2. Administrative Procedure (AP) C-40S3, "Use of PIMS Corrective Maintenance Work Order Module," will be revised to provide guidance for preparing for work activities in the vicinity of power lines or transformers, including clearances required.

3. Areas in the vicinity of high voltage lines and transformers within the protected area will be posted and barriers provided to assure that vehicular and equipment access are appropriately controlled.

4. Precautions and actions involved for safe work activities around high voltage lines, transformers, and switchgear will be included in General Employee Training.

5. The maintenance training program will be revised to include electrical safety issues when working on or around transformers, high voltage lines, or switchgear.

6. The Maintenance Supervisory training course currently includes tailboard training. A memorandum will be issued by the DCPP Vice President and Plant Manager to reemphasize the importance of conducting thorough tailboards.

7. AP C-14, "Dissemination of Operating Experience," which describes the operating experience assessment process, will be revised to include an initial team review of operating experience. The team review will prioritize and scope response to ensure timely and complete recommendations to management.

8. Procedures will be developed and issued prior to the next refueling outage to control power sources and to identify limitations during refueling outages.

Additional corrective actions are being identified and will be submitted in a supplemental LER.

VI. Additional Information

A. Failed Components:

None.

B. Previous LERs:

None.

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HUG,M.T. Portland General Electric Co.
SHIFFER,J.D. Portland General Electric Co.
RECIP.NAME RECIPIENT AFFILIATION

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	NRR/DLPQ/LPEB10	1	1	NRR/DOEA/OEAB	1	1
	NRR/DREP/PRPB11	2	2	NRR/DST/SELB 8D	1	1
	NRR/DST/SICB 7E	1	1	NRR/DST/SPLB8D1	1	1
	NRR/DST/SRXB 8E	1	1	REG FILE 02	1	1
	RES/DSIR/EIB	1	1	RGN5 FILE 01	1	1
EXTERNAL:	EG&G BRYCE,J.H	3	3	L ST LOBBY WARD	1	1
	NRC PDR	1	1	NSIC MAYS,G	1	1
	NSIC MURPHY,G.A	1	1	NUDOCS FULL TXT	1	1

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James D. Shiffer
Senior Vice President and
General Manager
Nuclear Power Generation

April 8, 1991

PG&E Letter No. DCL-91-079

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Re: Docket No. 50-275, OL-DPR-80
Diablo Canyon Unit 1
Licensee Event Report 1-91-004-00, Loss of Offsite Power During Refueling Caused by a Crane Due to Personnel Error
Special Report 91-02, Diesel Generator 1-1 Failure to Load Within Technical Specification Limits

Gentlemen:

Pursuant to 10 CFR 50.73(a)(2)(iv), 10 CFR 50.73(a)(2)(v), and Technical Specification (TS) 4.8.1.1.2, PG&E is submitting the enclosed Licensee Event Report (LER) concerning the loss of offsite power to Unit 1 due to personnel error and a Special Report regarding the non-valid failure of emergency Diesel Generator (DG) 1-1. The DG did not load within the 10 seconds required by TS.

Information Regarding LER 1-91-004-00

The event discussed in this LER was also discussed in PG&E's Letter No. DCL-91-049, dated March 7, 1991. Following the event, an Event Investigation Team (EIT) was convened to investigate the causes and possible corrective actions. Not all corrective actions identified by the EIT are included in this LER since the actions are not specifically related to the LER event. An Augmented Inspection Team (AIT) has reviewed the event, and this LER takes into account some of the comments and insights of the AIT. PG&E plans to submit a supplement to this LER following additional identification and finalization of corrective actions. This supplement will include as necessary an evaluation of any formal AIT findings. All corrective actions will be substantially or fully complete prior to PG&E's next refueling outage.

Information Regarding Special Report 91-02

Using the guidance of Regulatory Guide (RG) 1.108, Sections B and C.2.e, the failure of DG 1-1 to load to its vital bus within 10 seconds is considered to be a non-valid failure. The failure to load is discussed in the LER forwarded by this letter. In accordance with RG 1.108, Section C.3.b, the following information is provided:

1. DG involved: DG 1-1

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

IE22
1/1

3. Cause of failure: Unknown.

4. Corrective measures taken:
   a) Immediate Corrective Action: DG 1-1 was declared inoperable and troubleshooting began.
   b) To Prevent Recurrence: No corrective actions to prevent recurrence were identified as the cause could not be identified.

5. Time DG was unavailable: DG 1-1 was declared inoperable at 0839 PST, March 11, 1991, and declared operable at 1750 PST, March 24, 1991, after successful performance of surveillance tests which verified the loading time of the DG. The total time of unavailability of DG 1-1 was 321 hours and 11 minutes.

6. Current surveillance test interval: 31 days

7. Confirmation of proper test interval: The total number of valid failures in the last 100 valid tests for DG 1-1 is 2, and the total number of valid failures in the last 20 valid tests for DG 1-1 is 0; therefore, the 31 day test interval is in compliance with the schedule of TS Table 4.8-1 and an accelerated testing schedule is not required.

These events have in no way effected the health and safety of the public.

Sincerely,

J. D. Shiffer

cc: Ann P. Hodgdon
John B. Martin
Phillip J. Morrill
Paul P. Narbut
Harry Rood
CPUC
Diablo Distribution
INPO

DC1-91-MM-N028
DC1-91-TN-N032

Enclosure

5299S/0085K/ALN/2246

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
DIABLO CANYON UNIT 1	0 5 0 0 0 2 7 5	1 OF 12

TITLE (4) LOSS OF OFFSITE POWER DURING REFUELING CAUSED BY A CRANE DUE TO PERSONNEL ERROR

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 NAMES	DOCKET NUMBER (S)
03	07	91	91	- 0 0 4 -	0 0	04	08	91		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	6
POWER LEVEL (10)	0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11)

X 10 CFR 50.73(a)(2)(iv) and 50.73(a)(2)(v)

OTHER -

(Specify in Abstract below and in text, NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER AREA CODE	TELEPHONE NUMBER
MARTIN T. HUG, SENIOR REGULATORY COMPLIANCE ENGINEER	805	545-4005

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
| X | YES (if yes, complete EXPECTED SUBMISSION DATE)	| | NO		06	06	91

ABSTRACT (16)

On March 7, 1991, at 0807 PST, with Unit 1 in Mode 6 (Refueling) at 0 percent power, a loss of offsite power to Unit 1 occurred when a mobile crane boom came too close to the 500 kV power lines. The 500 kV line arced to ground through the crane boom, and caused the loss of offsite power. The emergency diesel generators started and loaded to the vital busses. An Unusual Event was declared at 0830 PST, March 7, 1991. A one-hour emergency report was made in accordance with 10 CFR 50.72(a)(3) at 0900 PST. A four-hour non-emergency report was made in accordance with 10 CFR 50.72(b)(2)(ii) and (b)(2)(iii) on March 7, 1991, at 1011 PST, due to the actuation of engineered safety features and momentary loss of RHR, respectively. The special report is being submitted as the result of the non-valid failure of DG 1-1 that occurred during the event.

The root cause was determined to be personnel error by the crane operator and the foreman in implementation of PG&E's accident prevention rules. Contributory causes included inadequate implementation of the recommendations made in response to NUREG-1410 regarding the loss of offsite power at Vogtle, inadequate training concerning electrical safety issues for non-electrical workers, and work practices not requiring a clearance for crane operation in the area of high voltage lines and transformers.

Following the event, the plant manager stopped all non-critical work for 24 hours to allow personnel to review remaining outage work for safety considerations. Corrective actions to prevent recurrence include training applicable personnel on electrical safety issues, posting warnings signs around high voltage lines and transformers within the plant protected area, issuing a memorandum stressing the importance of tailboards, and revising the operating experience assessment process to assure more timely and thorough response. A supplemental report will be issued after review of additional corrective actions.

I. Plant Conditions

Unit 1 was in Mode 6 (Refueling) at 0 percent power for the Unit 1 fourth refueling outage. Offsite electrical power was being supplied to the unit from the 500 kV system (FK). The Unit 1 230 kV startup power system (FK) was cleared for maintenance, and all three emergency diesel generators (DGs) (EK)(DG) were available. This electrical configuration was planned as part of the AC power source management during plant outage conditions in response to NUREG-1410, "Loss of Vital AC Power and the Residual Heat Removal System During Mid-Loop Operations at Vogtle Unit 1 on March 20, 1990."

II. Description of Event

A. Event:

On March 7, 1991, a mobile crane was being used to lift a relief valve (SB)(RV) into position for installation onto a main steam (SB) line outside of containment (NH). The crane was grounded to the main transformer (FK)(XFMR) grounding pad.

At 0807 PST, the boom of the mobile crane came too close to one phase of the 500 kV system and caused a flashover from the conductor. This caused the 500 kV system power circuit breaker (PCB) PCB-532 (FK)(52) to open and isolate offsite power from Unit 1. The 230 kV startup power system had been cleared for maintenance and was not available. The crane operator and other work crew personnel were not injured during the event.

At the time of the event, refueling was in progress with five fuel assemblies (AC) remaining to be reloaded to complete the reload sequence. One new fuel assembly was located in the manipulator crane mast (DF)(CRN) in the full-up position. The manipulator crane was positioned over the core (AC). Another new fuel assembly was located in the upender (DF) inside containment in the horizontal position. The other three assemblies were in the spent fuel pool.

At 0807 PST, all three DGs automatically started, supplying power to their respective 4 kV vital busses (EB). The senior control operator verified that an auxiliary salt water (ASW) pump (BS)(P), two component cooling water (CCW) pumps (BI)(P), all containment fan cooling units (CFCUs) (BK)(FCU), and one centrifugal charging pump (CCP) (BQ)(P) were running. At 0808 PST, a Unit 1 control operator manually started Residual Heat Removal (RHR) Pump (BP)(P) 1-2. An announcement was made over the public address system (PA) to suspend fuel movement due to the loss of offsite power; however, fuel movement had already been suspended due to loss of normal lighting (FF) in the Unit 1 fuel handling building (FHB)(ND) and containment building.

At 0820 PST, the senior reactor operator in charge of refueling determined, after conversations with control room personnel, that the loss of power would continue for some time. He directed that the manipulator crane be manually moved away from the core region.

In accordance with plant procedures, the Shift Supervisor declared an Unusual Event at 0830 PST due to the loss of offsite power. Unit 2 was not affected by the event, and all safety systems for Unit 2 remained operable.

The San Luis Obispo County Sheriff's office Watch Commander was notified at 0837 PST, March 7, 1991. The one-hour emergency report was made to the NRC in accordance with 10 CFR 50.72(a)(3) at 0900 PST. At 1011 PST, a four-hour non-emergency report was made in accordance with 10 CFR 50.72(b)(2)(ii) and 50.72(b)(2)(iii). The four-hour report was made due to the temporary loss of RHR, the starting of the DGs, and the transfer of the control room ventilation system (VI) to Mode 4 (pressurization). The FHB ventilation system (VG) transferred to the iodine removal mode of operation; however, this information was not included in the report.

By 0930 PST, an action plan was developed to restore offsite power to Unit 1. During the development of the action plan, management considered restoration of offsite power from both the 500 and 230 kV systems. Further review determined that the 230 kV startup power system could be more quickly restored by reenergizing the 230 kV switchgear (FK)(SWGR). The switchgear had been cleared the previous day for maintenance and was within a few hours of being returned to service. The decision was made to restore offsite power via the 230 kV startup power system because the condition of the 500 kV line and transformer was unknown, and the operability of the crane was unknown. Since the plant was in a stable condition, and all vital loads were being carried by the DGs, this work was not performed as emergency maintenance.

At 1228 PST, offsite power was restored to the Unit 1 Startup Transformer 1-2 (FK)(XFMR).

At 1252 PST, operators began returning vital busses to startup power and shutting down the DGs. By 1300 PST, all Unit 1 busses were energized from offsite 230 kV startup power system and all DGs were shut down. All busses and electrical equipment were walked down and no abnormalities were noted.

At 1325 PST, March 7, 1991, with offsite electrical power restored to all Unit 1 electrical systems via the 230 kV system and with the emergency DGs shutdown, the Unusual Event was terminated.

At 1600 PST, the plant manager conducted a meeting for all supervisory

personnel, informing them that all non-critical work would be stopped for 24 hours to allow supervisors to review with their personnel any potential safety concerns with remaining outage work.

At 1638 PST, the core reload was resumed. The core reload was completed at 1814 PST, and the core flux mapping was completed at 1940 PST.

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

The 230 kV startup power system was unavailable due to maintenance activities.

C. Dates and Approximate Times for Major Occurrences:

1. March 7, 1991 at 0807 PST: Event/Discovery date - While attempting to position a relief valve, a crane boom causes one phase of the 500 kV line to arc to ground. All offsite power was lost to Unit 1. All 3 DGs auto-started and supplied power to their respective vital busses.

2. March 7, 1991, at 0820 PST: A new fuel assembly suspended over the core in the manipulator crane mast was manually moved to clear the core region.

3. March 7, 1991, at 0830 PST: An Unusual Event was declared due to loss of offsite power.

4. March 7, 1991, at 0900 PST: A 1-hour emergency report was made to the NRC in accordance with 10 CFR 50.72(a)(3).

5. March 7, 1991, at 0930 PST: An action plan for recovery of offsite power was developed.

6. March 7, 1991, at 1011 PST: A 4-hour non-emergency report was made to the NRC in accordance with 10 CFR 50.72(a)(2)(ii) and 50.72(a)(2)(iii).

7. March 7, 1991, at 1325 PST: The Unusual Event was terminated with offsite power restored from the 230 kV startup power system.

D. Other Systems or Secondary Functions Affected:

1. Auxiliary building (NS) fans (VF)(FAN) could not be restarted after the vital busses were reenergized by the DGs.

   An electrical power supply for the auxiliary building ventilation control system (VF) failed after the event. Investigation determined that the voltage regulator (VF)(90) for the power supply and several capacitors (VF)(CAP) had failed. The failed components were replaced, and the loss of power event was simulated. The power supply responded normally.

2. The control room ventilation system shifted to Mode 4 when offsite power was lost. This constituted an engineered safety feature (ESF) actuation.

   At the time of the event, the normal power supply for Radiation Monitor RM-26 (IL)(DET) was out of service for maintenance, and the monitor was being powered from its backup power supply. RM-26 monitors radiation levels at the control room ventilation system intake. When power was lost to Unit 1, RM-26 was deenergized until vital power was restored from the DGs. When power was lost to RM-26, it alarmed as designed and initiated the control room ventilation system shift to Mode 4. The equipment functioned as designed.

3. Following the loss of Unit 1 AC power, the Unit 1 control room emergency lighting (FH) failed to function. Lighting was restored when the normal control room lighting distribution panel was cross-connected to the Unit 2 supply. Subsequently, a walkdown of the emergency lighting supply found that the manual transfer switch (FH)(HS) to the emergency lighting dimmer panel was selected to the backup source and not to the emergency inverter (FH)(INVT). The backup source is supplied off of 480 volt bus 12D, which is not powered from the vital bus, and thus was not available during the loss of AC power. The inverter for the DC power supply had previously failed and did not provide power to the control room emergency lighting. Action has been initiated to investigate and resolve this problem.

4. The FHB ventilation system transferred from the normal mode of operation to the iodine removal mode. This constitutes an ESF actuation.

   Radiation Monitor RM-59 (IL)(DET) was powered from Instrument AC panel PY-13 (PAN), which was powered from its back-up transformer (IL)XFMR). When offsite power was lost, the back-up transformer, and subsequently RM-59, lost power. When power was lost to RM-59, it alarmed as designed. The alarm on RM-59

initiated a transfer of the FHB ventilation system to the iodine removal mode. All equipment functioned as designed.

5. DG 1-1 started and loaded to its vital bus. During an NRC inspector's review of the annunciator (IB) printout, the failure of DG 1-1 to load to its vital bus within ten seconds of the event, as required by TS 4.8.1.1.2, was noted. DG 1-1 took approximately 19 seconds to start and load to the bus. This constitutes a non-valid failure of DG 1-1.

   An investigation was conducted to identify the cause of the delay in loading. The investigation did not identify any problems with the DG starting and loading circuitry. The following actions were performed to identify the cause:

   a. Surveillance Test Procedure (STP) M-13H, "4kV Bus H Auto Transfer Timers Setting Verification," was performed in an attempt to recreate the event prior to any maintenance activities. The STP tests the portion of the circuitry responsible for starting and loading the DG. During this test, the auxiliary power feeder breaker is manually opened. During the event, the auxiliary power feeder breaker opened automatically due to the loss of power. The DG loaded to its vital bus within ten seconds. The STP did not identify any problems.

   b. STP M-15, Part B, "Integrated Test of Engineered Safeguards and Diesel Generators," was performed three times. This STP tests the circuitry responsible for starting and loading the DG, and automatically opens the auxiliary power feeder breaker on a safety injection (SI) signal. All portions of the circuitry that actuated during the event, except for the auxiliary breaker opening automatically, were tested during this STP. The DG started and loaded onto its vital bus within ten seconds each time. The STP did not identify a problem with the circuitry. Visicorder traces of the relays in the circuitry were obtained. No anomalies were noted on the traces.

   c. During the first performance of STP M-15, Part B, an inconsistency was noted in the annunciator printout for the sequence of events.

      One inconsistency was the clearing of an undervoltage alarm on one DG prior to the alarm registering. The other inconsistency was that the sequence of events was not printed in chronological order.

      The annunciator printout and system software were reviewed

to determine if a problem existed. The review concluded that no problems existed with the annunciator.

d. The starting circuitry sequence was reviewed. During the event, it was determined that since the load shed relay (27XHHT) (EK)(RLY) was actuated, the first level undervoltage circuitry worked as designed. The problem occurred downstream of the load shed relay. The circuitry subsequently functioned satisfactorily four times, once during performance of STP M-13H and three times during performance of STP M-15, Part B.

The relays and switches in the DG 1-1 feeder breaker closing circuit were reviewed to ascertain if there was proof that they functioned correctly, or if they could have delayed the closing of the DG onto the vital bus. All those relays which could have functioned incorrectly were tested by the STPs performed subsequent to the event and functioned correctly.

e. The loss of offsite power event was reviewed against STP M-15, Part B, to determine differences between the test and the event. The review identified several differences:

1. A 300 MW ground fault occurred during the event. This condition cannot be safely recreated.

2. The 230 kV startup power system was unavailable due to maintenance at the time of the event.

3. The DG started due to a loss of power signal during the event. During STP M-15, Part B, the DGs started as the result of an SI signal. Both the loss of power signal and the SI signal test the same DG start circuitry.

The change analysis did not identify any differences between the loss of offsite power and the performance of STP M-15, Part B, that could be recreated.

Investigation into the problem failed to identify any possible cause for the failure of DG 1-1 to load to its vital bus within ten seconds. The DG 1-1 problem could not be recreated.

E. Method of Discovery:

The loss of offsite power event was immediately apparent to plant operators due to alarms and indications received in the control room and the loss of lighting in Unit 1.

F. Operators Actions:

1. Operations personnel suspended fuel movement in the FHB and containment.

2. Equipment designed to auto-start was verified to be running.

3. RHR Pump 1-2 was manually restarted. The pump is not intended to automatically restart after vital bus transfer in Mode 6.

4. The manipulator crane was manually moved away from the core region.

5. Spent Fuel Pool Cooling Pump (DA)(P) 1-2 was restarted. The pump is not intended to automatically restart after vital bus transfers.

6. Plant busses were reconfigured to restore offsite power from the 230 kV startup power system.

G. Safety System Responses:

1. DGs 1-1, 1-2, and 1-3 started and loaded to supply power to vital busses.

2. ASW Pump 1-2 restarted on bus transfer. ASW Pump 1-1 was cleared for maintenance.

3. All CFCUs auto-started on bus transfer.

4. CCP 1-2 auto-started on bus transfer. CCP 1-1 was cleared for maintenance.

5. CCW Pumps 1-1, 1-2 and 1-3 auto-started on bus transfer.

III. Cause of the Event

A. Immediate Cause:

The immediate cause of the loss of offsite power was the grounding of the 500 kV line through the boom of the mobile crane.

B. Root Cause:

The root cause was determined to be personnel error (cognitive) in that the crane operator and the foreman did not follow the accident prevention rules and did not recognize the electrical safety issues during job planning and execution.

C. Contributory Cause:

The contributory causes were determined to be:

1. Work practices, which require a clearance for crane operation in the area of high voltage lines or transformers, were not followed.

2. The evaluation by PG&E of NRC Information Notice 90-25, "Loss of Vital AC Power With Subsequent Reactor Coolant System Heat-up," and NUREG-1410 and the resulting corrective actions were ineffective in precluding this event. While PG&E had evaluated the events described in these reports, as a result of the method used to prioritize corrective actions identified through PG&E's operating experience assessment program the proposed actions had not yet been presented to management for approval.

3. Communication in the tailboard prior to beginning installation of the relief valve was not adequate to provide necessary job safety information to the foreman or crew.

4. Training was not adequate on electrical safety issues for non-electrical workers.

IV. Analysis of the Event

A. Safety Analysis:

During the event, RHR capability was lost for less than one minute, and the spent fuel pool pumps were inoperable for approximately 23 minutes. One pump was manually restarted. During the time the pumps were not running, the calculated maximum temperature rise was approximately 1.8 degrees Fahrenheit. There was no loss of inventory in the refueling cavity or the spent fuel pool.

In Mode 6, the purpose of the RHR system is to remove decay heat from the fuel assemblies in the reactor vessel (AB)(RPV). The purpose of the spent fuel cooling pumps is to remove decay heat from spent fuel elements.

When the event occurred, all but five fuel assemblies had been loaded into the core. With the RHR and spent fuel cooling pumps inoperable, the water temperature in the refueling cavity would begin to increase approximately 4.6 degrees Fahrenheit per hour. It was determined that, if the water in the refueling cavity was at 90 degrees Fahrenheit initially and if the cycle 5 core had been completely reloaded at the time of the event, it would have taken approximately 26 hours for the water in the refueling cavity to begin to boil. This time conservatively assumes that no heat transfer to the concrete or

to the atmosphere occurs.

If the event had occurred at the beginning of the outage, and the entire cycle 4 core had just been unloaded into the spent fuel pool, the heat input to the water in the pool would have been approximately 12 MW. Assuming the water was initially at 90 degrees Fahrenheit and the pool level was at the 137 foot elevation, it would take approximately 8 hours for the water in the spent fuel pool to begin to boil if all power was lost to the unit. This time conservatively assumes that no heat transfer occurs from the water to the pool liner or the atmosphere.

Had the DGs not started or had they been unavailable, power to the RHR pumps would have had to be supplied through the offsite power system. It took approximately 5 hours to restore offsite power from the 230 kV system. This would provide for restoration of the RHR pumps prior to boiling of the water in the refueling cavity with either the cycle 4 or cycle 5 core in the reactor vessel. If the event had occurred at a time when the 230 kV system could not have been quickly restored, conservative estimates concluded that offsite power from the 500 kV system could have been restored in approximately 4 hours using emergency maintenance procedures. This estimated time includes initial operator response to the event, removing the crane from the vicinity of the 500 kV lines even if the crane had been rendered inoperable by the event, removal of grounds from the line, and switching to restore power. The four hours estimated to restore offsite power, and subsequently RHR, from the 500 kV system is less than the time required to boil the water in the refueling cavity.

Since the water in the reactor cavity or spent fuel pool would not have boiled prior to cooling being restored, and therefore inventory would not have been depleted, the health and safety of the public were not significantly affected by the event.

V. Corrective Actions

A. Immediate Corrective Actions:

1. An Event Investigation Team was convened to investigate the problem.

2. Offsite power was restored via the 230 kV system.

3. All outage work was suspended for a period of 24 hours.

4. A letter from the Senior Vice President and General Manager was issued to all plant personnel emphasizing safety on the job.

B. Corrective Actions to Prevent Recurrence:

1. All appropriate plant and General Construction personnel will be trained on the electrical safety portions of the PG&E accident prevention rules.

2. Administrative Procedure (AP) C-40S3, "Use of PIMS Corrective Maintenance Work Order Module," will be revised to provide guidance for preparing for work activities in the vicinity of power lines or transformers, including clearances required.

3. Areas in the vicinity of high voltage lines and transformers within the protected area will be posted and barriers provided to assure that vehicular and equipment access are appropriately controlled.

4. Precautions and actions involved for safe work activities around high voltage lines, transformers, and switchgear will be included in General Employee Training.

5. The maintenance training program will be revised to include electrical safety issues when working on or around transformers, high voltage lines, or switchgear.

6. The Maintenance Supervisory training course currently includes tailboard training. A memorandum will be issued by the DCPP Vice President and Plant Manager to reemphasize the importance of conducting thorough tailboards.

7. AP C-14, "Dissemination of Operating Experience," which describes the operating experience assessment process, will be revised to include an initial team review of operating experience. The team review will prioritize and scope response to ensure timely and complete recommendations to management.

8. Procedures will be developed and issued prior to the next refueling outage to control power sources and to identify limitations during refueling outages.

Additional corrective actions are being identified and will be submitted in a supplemental LER.

VI. Additional Information

A. Failed Components:

None.

B. Previous LERs:

None.