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 FACIL: 50-323 Diablo Canyon Nuclear Power Plant, Unit 2, Pacific Ga      05000323  
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 RECIP. NAME      RECIPIENT AFFILIATION

SUBJECT: LER 93-002-01: on 930904, TS 3.7.6.1 was violated due to  
 auxiliary building ventilation sys inoperability caused by  
 inadequate work instructions. Revised recurring task.  
 W/930907 ltr.

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Gregory M. Rueger  
Senior Vice President and  
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September 7, 1993

PG&E Letter No. DCL-93-219

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

Re: Docket No. 50-323, OL-DPR-82  
Diablo Canyon Unit 2  
Licensee Event Report 2-93-002-01  
Entry Into Technical Specification 3.0.3 Due to Auxiliary Building  
Ventilation System Inoperability Caused by Inadequate Work  
Instructions

Gentlemen:

Pursuant to 10 CFR 50.73(a)(2)(i)(B), PG&E is submitting the enclosed revision to Licensee Event Report 2-93-002 regarding Unit 2 entry into Technical Specification 3.0.3 due to the auxiliary building ventilation system inoperability caused by inadequate work instructions. This revision is being submitted to report the root cause and corrective actions of this event. Revision bars are included to indicate the changes.

Sincerely,



Gregory M. Rueger

cc: Bobby H. Faulkenberry  
Ann P. Hodgdon  
Mary H. Miller  
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DC2-93-MM-N012

Enclosure

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# LICENSEE EVENT REPORT (LER)

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TITLE (4) **ENTRY INTO TECHNICAL SPECIFICATION 3.0.3 DUE TO AUXILIARY BUILDING VENTILATION SYSTEM INOPERABILITY CAUSED BY INADEQUATE WORK INSTRUCTIONS**

EVENT DATE (6)			LER NUMBER (8)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)						
MON	DAY	YR	YR	SEQUENTIAL NUMBER		REVISION NUMBER	MON	DAY	YR	FACILITY NAMES			DOCKET NUMBER (5)		
03	04	93	93	-	0 0 2	- 0 1	09	07	93				0	5	0 0 0

OPERATING MODE (9) **1** THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11)

POWER LEVEL (10) **0 5 0** ☒ 10 CFR 50.73(a)(2)(i)(B)  
☐ OTHER - \_\_\_\_\_  
 (Specify in Abstract below and in text, NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)		TELEPHONE NUMBER	
<b>DAVID P. SISK, SENIOR REGULATORY COMPLIANCE ENGINEER</b>		AREA CODE	
		<b>805</b>	<b>545-4420</b>

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
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ABSTRACT (16)

On March 4, 1993, at 1242 PST, with Unit 2 in Mode 1 (Power Operation) at 50 percent power, Technical Specification (TS) 3.7.6.1 was not met and TS 3.0.3 was entered. One train of the auxiliary building ventilation system (ABVS) was made inoperable by the closure of a manual damper during the performance of a preventive maintenance activity. Since the other train of the ABVS was already inoperable for this maintenance activity, TS 3.0.3 was entered.

On March 4, 1993, at 1257 PST, PG&E operators instructed maintenance personnel to reopen the manual dampers that had been closed. One train of the ABVS air flow was reestablished and the TS 3.0.3 action statement was exited.

The root cause of this event was determined to be personnel error, both cognitive and noncognitive, in that a clearance was changed without adequate knowledge of the task to be performed and in that the recurring task (RT) work orders contained inadequate instructions and as a result were misinterpreted.

The RT work orders and RT clearance instructions were revised to provide more explicit instructions. The event was discussed with Mechanical Maintenance foremen. Instructions were issued to reemphasize the need to review Design Change Memorandums when altering clearances associated with the ABVS and/or the fuel handling building ventilation system.



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## I. Plant Conditions

Unit 2 was in Mode 1 (Power Operation) at 50 percent power.

## II. Description of Event

### A. Summary:

On March 4, 1993, at 1242 PST, with Unit 2 in Mode 1 (Power Operation) at 50 percent power, Technical Specification (TS) 3.7.6.1 was not met and TS 3.0.3 was entered. One train of the auxiliary building ventilation system (ABVS) was made inoperable by the closure of a manual damper (VF)(DMP) during a preventive maintenance activity. Since the other train of the ABVS was already inoperable for this maintenance activity, TS 3.0.3 was entered.

On March 4, 1993, at 1257 PST, PG&E operators instructed PG&E maintenance personnel to reopen the manual dampers. One train of the ABVS air flow was reestablished and the TS 3.0.3 action statement was exited.

### B. Background:

Each unit has two ventilation trains. The ABVS main function is to maintain the ambient temperature around engineered safety feature (ESF) equipment within acceptable limits and to filter exhausted air to minimize the amount of radiation released during accident conditions.

The ABVS has three modes of operation. The first mode is the building only ventilation mode, with one supply and one exhaust fan (NF)(VF)(FAN) in operation. The second mode is the building and safeguards mode, with two supply and two exhaust fans in operation. The third mode is the safeguards only mode, with one supply and one exhaust fan in operation. A safety injection (SI) "S" signal redirects the safeguards only mode exhaust flow through the charcoal adsorber banks (NF)(VF)(ADS).

TS 3.7.6.1 requires that two auxiliary building (NF) safeguards air filtration system exhaust trains with one common high efficiency particulate air (HEPA) filter (NF)(VF)(FLT) and charcoal adsorber bank and at least two exhaust fans be operable in Modes 1 through 4 (Hot Shutdown).

### C. Event Description:

On March 2, 1993, Mechanical Maintenance personnel scheduled a clearance in preparation to perform a preventive maintenance activity to clean a flow element (FE-5016) (VF)(FI) associated with the Unit 2 ABVS. The clearance alignment for this maintenance activity places the ABVS in safeguards only mode with an SI "S" signal, which automatically opens





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Dampers 1A, and 1B and closes Dampers 2A, 2B, 4A, 4B, 8A and 8B (see drawing on Page 9). This maintenance activity had been previously performed successfully using the same clearance alignment. The work order that implemented the maintenance activity required closing the manual dampers, but did not specifically identify which manual dampers. The alignment of this system specifies routing of flow through the charcoal filters, which requires that painting and welding restrictions be imposed in the auxiliary building for the duration of the clearance.

On March 3, 1993, a request was made to impose welding and painting restrictions on the ABVS to be effective on March 4, 1993. These restrictions would have impacted on-going outage preparatory work. An alternate clearance was researched between System Engineering and the Operations coordinator and a new clearance was issued. This new clearance left the flow through the charcoal filters isolated. Dampers 1A and 1B remained closed. The flow path using Fan 2E-1 was through Dampers 2A and 2B, Manual Dampers (MDs) MD-3, MD-5A and MD-5B, Dampers 8A and 8B and MD-9 and MD-10. Dampers 4A and 4B remained closed and Fan 2E-2 disabled in order to perform the maintenance activity. The new clearance eliminated the requirement to initiate the "S" signal.

On March 4, 1993, Mechanical Maintenance personnel requested Operations approval to start work. The Unit 2 Shift Foreman determined that the work instructions were not specific regarding which dampers were required to be closed. The Mechanical Maintenance workers discussed the damper closure requirement with a maintenance engineer who previously had performed this activity and who indicated that MD-5A and MD-5B were required to be closed. The workers reported to the Shift Foreman and identified that MD-5A and MD-5B were required to be closed. The Shift Foreman agreed to the closure of those two dampers since this action maintained a flow path through MD-3. The maintenance workers were allowed to begin work and began so by closing MD-5A and MD-5B.

In order to enter the ducting that contained the FE-5016, an access hatch was required to be removed from the plenum in which the dampers were located. There was a differential pressure across the hatch. This prevented the workers from opening the hatch. Work was suspended and the Mechanical Maintenance foreman was contacted. The foreman noted that MD-3 on an upper elevation of the plenum was open. Although the maintenance personnel had informed the Unit 2 Shift Foreman that they were only going to close MD-5A and MD-5B, the work order instructions that required closure of the dampers were not specific as to which dampers to close. The Mechanical Maintenance foreman determined it was acceptable to close MD-3 since the work order instructions were not specific regarding the closure of dampers. This activity, previously performed under different alignment conditions, required MD-3 to be closed. When the Mechanical Maintenance foreman moved MD-3, a position switch activated and signaled the ABVS control logic to shut down the only ABVS operable fan (2E-1). Fan 2E-2 was already inoperable for this



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maintenance activity. Since both Unit 2 ABVS fans were inoperable, the requirements of TS 3.7.6.1 were not met and TS 3.0.3 was entered. One train of the ABVS was restored within 15 minutes. As a result, the requirements of TS 3.7.6.1 were met and TS 3.0.3 was exited.

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

None.

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

1. March 4, 1993, at 1242 PST: Event/Discovery date. The only operable ABVS train B was made inoperable by the closure of dampers for Fans 2E-1 and 2E-2. This resulted in the violation of TS 3.7.6.1 and entry into TS 3.0.3.
2. March 4, 1993, at 1257 PST: TS 3.7.6.1 requirements were met and TS 3.0.3 was exited when one train of the ABVS was restored to operability.

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

None.

**G. Method of Discovery:**

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

**H. Operator Actions:**

PG&E operators instructed maintenance personnel to reopen MD-5A, MD-5B, and MD-3 and restarted Fan 2E-1, which reestablished air flow through one train of the ABVS such that the TS 3.0.3 action statement was exited.

**I. Safety System Responses:**

None required.

**III. Cause of the Event**

**A. Immediate Cause:**

The immediate cause of this event was the inadvertent trip of the ABVS Exhaust Fan 2E-1 due to the loss of the suction flow path.



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## B. Root Cause:

1. One root cause was determined to be a personnel error (non-cognitive) on the part of a PG&E non-licensed system engineer, in that he was unaware of the potential for error that might result from a change to a clearance that supported a preventive maintenance activity.
2. The second root cause was a personnel error (cognitive) on the part of a PG&E non-licensed maintenance foreman who misinterpreted unclear work order steps and as a result closed MD-3.

## C. Contributory Cause:

This event was unique to the ABVS and resulted from the following contributory causes:

1. The original clearance was revised to support pre-outage work activities. The coordination of the revised clearance did not completely research the basis for why the normally-performed work needed to be performed under the conditions of the original clearance or the difficulties that could occur if the clearance were altered.
2. The mechanical maintenance craftsman did not relay to the maintenance foreman the specific dampers that the shift foreman was told would be closed.

## IV. Analysis of the Event

The primary safety function of the ABVS is to maintain the ambient temperature around the ESF equipment within acceptable limits and filter air following a loss-of-coolant accident (LOCA) during the post-LOCA recirculation phase.

The FSAR Update Chapter 15 analyzes the off-site exposures from post-LOCA circulation loop leakage in the auxiliary building. Two cases are analyzed: large leakage and long-term small leakage. The large leakage case assumes a single passive failure of a residual heat removal pump seal (BP) (SEAL) and gives credit for filtration of radioactivity by the ABVS. An SI signal aligns the ABVS to the "S" signal mode. The operators manually depress the reset control to start Fan 2E-1. Therefore, there is no effect on the FSAR Update Chapter 15 analysis.

For the small leakage case, no credit was given in the FSAR Update for the charcoal filter. The control room dose has not been explicitly analyzed. A review of existing analysis and timing indicates that 10 CFR 50, Appendix A, General Design Criterion 19 limit will not be exceeded within the time required to restore the system operations (within 2 hours).



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Failure of the ABVS does not immediately jeopardize the operability of any safety-related equipment. A review of room heat-up curves indicates that 24 hours is available before any safety-related equipment could adversely be affected. Emergency Procedure (EP) E-0, "Reactor Trip or Safety Injection," has been previously revised to provide the operators with the necessary guidance to recover the ABVS. Based on the guidance provided in EP E-0 and the fact that EP E-0 is the first procedure implemented following a reactor trip for SI, the operators will promptly restore the ABVS to mitigate the consequences of an accident and provide cooling to the ESF equipment. In this event, MD-5A, MD-5B, and MD-3 were reopened and the air flow of the ABVS was reestablished within 15 minutes of the initiation of the event. Therefore, it has been demonstrated that the ABVS can be restored in much less than 24 hours. Since the safety functions of the ABVS would be accomplished, this event did not affect the health and safety of the public.

## V. Corrective Actions

### A. Immediate Corrective Actions:

1. MD-5A, MD-5B and MD-3 were reopened. Flow was reestablished through Fan 2E-1. The TS 3.0.3 action statement was exited.
2. All Preventive Maintenance (PM) for the Unit 1 ABVS and Fuel Handling Building Ventilation System (FHBVS) was suspended until actions were taken to prevent recurrence.

### B. Corrective Actions to Prevent Recurrence:

1. The RT clearance instructions associated with Units 1 and 2 ABVS flow element cleaning were revised to include specific directions regarding the need for the clearance to be performed the way it is described.
2. The RT Work Order (WO) instructions associated with Units 1 and 2 ABVS flow element cleaning were revised to clearly identify the dampers requiring manipulation. The instructions were also reviewed and updated as necessary to correct any potential for the system to be aligned in a manner that may impact its functional/operational requirements.
3. The Director of Mechanical Maintenance reviewed this event with the foremen to re-emphasize the importance of maintaining their overview responsibilities when resolving field problems.
4. An Operations Coordinator Instruction was generated to reemphasize the need to review Design Criteria Memorandums when altering clearances associated with the ABVS and/or FHBVS.





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5. The Work Planning Center supervisor reviewed this event with the workplanners to reemphasize the need for WOs to provide specific identification of equipment referenced in them.

## VI. Additional Information

### A. Failed Components:

None.

### B. Previous Similar Events:

LER 1-92-011-00 - Entry Into Technical Specification 3.0.3 Because of Auxiliary Building Ventilation System Inoperability Due to Noncognitive Personnel Error

On December 17, 1992, TS 3.7.6.1 was not met for the auxiliary building when Exhaust Fan E-1 tripped, while Exhaust Fan E-2 and Supply Fan S-34 were secured for maintenance. As a result, TS 3.0.3 was entered.

The root cause was determined to be personnel error, noncognitive, in that licensed operators knew that resetting the "S" signal would reposition the dampers, but did not know that Exhaust Fan E-1 would shut down and restart while the dampers repositioned. Corrective actions include the revision of applicable procedures to include precautions when maintenance verification testing is being performed on the applicable ABVS dampers. The corrective actions for the previous event did not prevent this event since both root causes were unrelated personnel errors.

LER 1-92-012-01 - Entry Into Technical Specification 3.0.3 Due to Auxiliary Building Ventilation System Inoperability Resulting from a Single Failure

On August 8, 1992, TS 3.7.6.1 was not met for the auxiliary building when both ventilation trains failed for approximately 38 minutes. As a result, TS 3.0.3 was entered.

On August 11, 1992, a preliminary engineering assessment of the ABVS design determined that a loss of 125 VDC sensor power (JG)(EJ) to one train of the ventilation system could cause a loss of the fans in the other train, resulting in a complete loss of the ABVS. Consequently, the ABVS appeared susceptible to a common mode failure and therefore might be unable to mitigate the consequences of an accident simultaneously with a single failure. The root cause of this event was personnel error, cognitive, in that the responsible engineer for the addition of flow switches (in the mid-1970s) did not evaluate the effect on the control logic of a loss of DC power as part of the design change failure modes and effects analysis. The corrective action for this



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previous LER is to implement a design change to eliminate the potential for an ABVS common mode failure. The corrective actions for this previous LER would not have prevented the current event since the current event does not involve a loss of 125 VDC sensor power to the ABVS.



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