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January 24, 2013

PG&E Letter DCL-13-004

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

10 CFR 50.73

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Licensee Event Report 1-2011-008-01, Control Room Ventilation System Design Vulnerability

Dear Commissioners and Staff:

Pacific Gas and Electric Company (PG&E) submits the enclosed Licensee Event Report (LER) supplement regarding control room envelope (CRE) in-leakage testing. Both Units 1 and 2 are affected by this issue. PG&E is submitting this LER supplement in accordance with 10 CFR 50.73(a)(2)(i)(B) and 10 CFR 50.73(a)(2)(ii)(B). This supplement includes PG&E's actions following the NRC's review of Diablo Canyon's CRE testing documented in NRC Task Interface Agreement 2012-08. It also includes additional cause and corrective actions.

PG&E makes no new or revised regulatory commitments (as defined by NEI 99-04) in this report.

This event did not adversely affect the health and safety of the public.

Sincerely,

Barry S. Allen

wrl8/50428146
Enclosure
cc/enc: Elmo E. Collins, NRC Region IV
Thomas R. Hipschman, NRC Senior Resident Inspector
Joseph M. Sebrosky, NRR Senior Project Manager
INPO
Diablo Distribution

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@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.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE

Control Room Ventilation System Design Vulnerability

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
									Diablo Canyon, Unit 2	05000-323
11	03	2011	2011	- 008 -	01	01	24	2013	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

1

10. POWER LEVEL

100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☑ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☑ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Wilbert R. Landreth, Regulatory Services Engineer	(805) 545-6980

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

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☑ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On November 3, 2011, at 1550 PDT, operators determined that the Diablo Canyon Power Plant (DCPP) control room ventilation system (CRVS) had a design vulnerability whereby unfiltered air supplied to the control room (CR) could exceed the flowrates used in the licensing-basis analysis of design basis accident consequences. Pacific Gas and Electric Company (PG&E) discovered this vulnerability during performance of CR in-leakage testing required by Technical Specification (TS) Surveillance Requirement (SR) 3.7.10.5. Therefore, PG&E reported this event as an unanalyzed condition. Plant staff established configuration controls to ensure two CRVS trains would remain available and completed the in-leakage testing using both trains. PG&E is submitting this supplemental report to identify this concern as a condition prohibited by TS, following clarification from the NRC that the completed testing did not meet the requirements of SR 3.7.10.5.

Human error on the part of a 1991 Technical Review Group to eliminate the design vulnerability was the apparent cause of this issue. PG&E has implemented modifications to eliminate the design vulnerability, and successfully completed CR envelope testing using a single CRVS train. The incorrect conclusion that testing with both trains met SR 3.7.10.5 was due to unclear SR 3.7.10.5 bases. PG&E will revise the SR 3.7.10.5 bases, and the in-leakage test to provide the NRC's clarification in its Technical Interface Agreement 2012-08.

I. Plant Conditions

At the time of discovery, Units 1 and 2 were in Mode 1 (Power Operation) at 100 percent power.

II. Description of Problem

A. Background

The Unit 1 and 2 common control room ventilation system (CRVS) provides a protected environment from which operators can control the units from the common control room following an uncontrolled release of radioactivity, hazardous chemicals, or smoke. The CRVS consists of two trains (one CRVS train from each unit) that recirculate and filter the air in the common control room envelope (CRE), and a CRE boundary that limits the in-leakage of unfiltered air. A CRVS train is operable when the associated:

a. main supply fan [FAN] (one), filter booster fan (one) and pressurization fan (one) are operable;
b. high-efficiency particulate-air (HEPA) filters [FLT] and charcoal adsorbers [ADS] are not excessively restricting flow, and are capable of performing their filtration functions; and
c. ductwork [DUCT], valves [V], and dampers [DMP] are operable, and air circulation can be maintained.

Each train is comprised of two redundant, full-capacity, active components so that each train is composed of two subtrains. Technical Specification (TS) 3.7.10, "Control Room Ventilation System," for the CRVS pertains to the two CRVS trains rather than the four subtrains. Either of the two redundant subtrains are manually selected via a switch in the control room, with either subtrain in each unit capable of satisfying the CRVS train operability requirement (see page 7 for system diagram).

The CRVS is an emergency system, parts of which may also operate during normal unit operations. Upon receipt of an actuating signal, the normal air supply to the CRE is isolated, and the stream of outside ventilation air from the pressurization system and recirculated control room air is passed through a system filter. The pressurization system draws outside air from either the north end or the south end of the turbine building [NM]. The prefilters remove any large particles in the air to prevent excessive loading of the HEPA filters and charcoal adsorbers.

The CRVS is designed to maintain a habitable environment in the Units 1 and 2 common CRE for the duration of the most severe design basis accident (DBA) without exceeding 5-rem whole body dose or its equivalent to any part of the body (calculated over 30 days).

In NRC letter dated December 23, 2008, the NRC issued License Amendments 201 and 202 to Diablo Canyon Power Plant (DCPP) Units 1 and 2, respectively. These amendments revised the required action and surveillance requirements in TS 3.7.10, consistent with Technical Specification Task Force (TSTF) Traveler-448, "Control Room Habitability," Revision 3, establishing surveillance requirement (SR) 3.7.10.5 to test CR in-leakage.

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NARRATIVE

B. Event Description

On November 3, 2011, at 1550 PDT, operators determined that the DCPP CRVS had a design vulnerability whereby control room pressurization airflow could bypass the supply filter if neither CRVS booster fan in the train was operating. This would allow as much as 800 cubic feet per minute of unfiltered air to be delivered to the control room following an accident that resulted in initiation of the CRVS pressurization mode. Operators would have corrected this condition within 30 minutes after initiation of a safety injection by manually selecting and starting the train's redundant subtrain in accordance with existing, proceduralized actions specified in DCPP Emergency Operating Procedure (EOP) E-0, "Reactor Trip or Safety Injection," Appendix E, "ESF Auto Actions, Secondary and Auxiliaries Status."

Pacific Gas and Electric Company (PG&E) had not previously included this 30 minutes of unfiltered air supply to the control room in the analysis of record. This design vulnerability could have potentially resulted in operator dose greater than analyzed. Plant staff verified that all components and redundant components in each ventilation train were operable, and established configuration controls to ensure operator dose would continue to meet regulatory limits as a compensatory measure to restore operability. These compensatory measures assured both trains would remain available to operators even in the event of a single failure of an operating train. At 2051 PDT on November 3, 2011, PG&E made an 8-hour non-emergency report (see NRC Event Notification 47414) under 10 CFR 50.72(b)(3)(ii)(B).

PG&E noted that SR 3.7.10.5 TS bases stated "Temporary analytical methods may also be used as compensatory measures to restore operability. Options for restoring the CRE boundary to operable status include changing the licensing basis DBA consequence analysis, repairing the CRE boundary, or a combination of these actions." On December 1, 2011, PG&E declared the CRE operable after implementing compensatory measures and performing surveillance testing in the most limiting configuration permitted with the compensatory measures in place, demonstrating the capability of the compensated CRE boundary to ensure operator doses remain below regulatory limits.

On October 1, 2012, PG&E declared the CRE inoperable to modify the CRVS to eliminate the design vulnerability. On November 28, 2012, PG&E received the NRC's TIA 2012-08, "Final Response to Task Interface Agreement 2012-08, Diablo Canyon Power Plant, Unit 1 and 2 – Request Office of Nuclear Reactor Regulation's Review of Operability Issues Associated with Technical Specification 3.7.10, 'Control Room Ventilation System,'" dated November 20, 2012. The TIA concluded that DCPP's CRE had not been restored to operable status because PG&E "has not changed the licensing basis DBA or repaired the CRE boundary or performed a combination of these...Further, SR 3.7.10.5 requires testing the CRE in-leakage with the CRVS in the design basis accident configuration to verify the operability of the CRE boundary. Operation of CRVS equipment from both trains is not credited in the current licensing basis as part of the design basis configuration. Performing the in-leakage test with CRVS equipment from the opposite train in operation does not satisfy the requirements for performing SR 3.7.10.5." PG&E subsequently concluded that because the inleakage was performed with both trains operating, the SR had not been performed as required, nor had it ever been performed as required. Therefore, DCPP had been in violation of this TS since the issuance of License Amendments 201 and 202 for DCPP Units 1 and 2, regardless of the in-leakage flow rates obtained.

In December 2012, after modifying the CRVS, PG&E satisfactorily completed inleakage testing on the CRVS using a single CRVS train, successfully demonstrating acceptable inleakage in the most limiting configuration with a single CRVS train operating. Operators declared the CRE operable on December 20, 2012.

C. Status of Inoperable Structure, Systems, or Components That Contributed to the Event

None.

D. Other Systems or Secondary Functions Affected

This situation applies to both Units 1 and 2 when the CRVS pressurization mode is required. However, the CRVS trains remained capable of performing their normal ventilation functions.

E. Method of Discovery

PG&E discovered this design vulnerability during performance of Surveillance Test Procedure (STP) M-57, "Control Room Ventilation System Tracer Gas Test," to satisfy TS SR 3.7.10.5.

On November 28, 2012, PG&E received the NRC's TIA 2012-08, which clarified the compensatory measures acceptable to the NRC that would allow declaration of operability following in-leakage test failure. Consequently, PG&E recognized that the CRE had been incorrectly declared operable, contrary to the requirements of TS 3.7.10.

F. Operator Actions

Plant staff verified that all components and redundant components in each ventilation train were operable, and established configuration controls to ensure operator dose would continue to meet regulatory limits. Operations issued an Operations Standing Order instructing operators to enter TS 3.7.10.A any time a CRVS supply fan or a booster fan is not available as a compensatory measure to restore and maintain operability. PG&E had also previously revised STP M-87, "Operational Leak Inventory of ECCS Systems Outside Containment Likely to Contain Highly Radioactive Fluids Following an Accident," to limit post-loss-of-coolant-accident emergency core cooling system (ECCS) leakage. These actions ensured operator doses would be maintained less than the Final Safety Analysis Report accident analysis results for the highest unfiltered air inleakage rate reported in STP M-57 as well as mitigating the consequences of a potential 800 scfm of filter bypass flow.

G. Safety System Responses

None.

III. Cause of the Problem

PG&E first identified and documented this design vulnerability in 1991 in a nonconformance report. Human error on the part of a Technical Review Group (root cause evaluation team) in 1991 to eliminate the design vulnerability

was the apparent cause of this issue in that the team focused on managing the consequences of the design vulnerability rather than eliminating it (see Section VI.B, "Previous Similar Events," of this licensee event report).

The cause of incorrectly declaring the CRVS operable was that the bases for SR 3.7.10.5 were unclear and subject to multiple interpretations that PG&E clarified via consulting industry experts versus requesting that NRC clarify the intent.

IV. Assessment of Safety Consequences

PG&E modeled the potential dose to control room operators using the as-found condition of 800 scfm bypass flow, measured CRE unfiltered in-leakage of 51 scfm and ECCS leakage of 0.42 gallons per minute, and concluded that the dose to control room operators would not have exceeded 5-rem whole body dose or its equivalent to any part of the body (calculated over 30 days) if one subtrain in each train was started within 30 minutes. ECCS leakage over the past 3 years has remained less than 0.14 gpm. PG&E's review of CRVS configuration for the past 3 years confirmed that at least one subtrain in each CRVS train was functional and available to operators at all times.

This event did not result in failure of equipment or a radiological release to plant personnel or the public. Therefore, this event did not adversely affect the health and safety of the public.

V. Corrective Actions

PG&E implemented modifications to eliminate the design vulnerability.

PG&E performed testing of the CRVS in an alignment as clarified by the NRC's TIA 2012-08 following CRVS modification. Control room operators exited TS 3.7.10, Condition B, on December 20, 2012.

PG&E will revise the SR 3.7.10.5 bases, and the in-leakage test to address the NRC's clarification in its TIA 2012-08. PG&E revised the DCPP Current Licensing Basis Determination procedure to provide guidance to seek NRC clarification on issues that may involve difference in NRC and industry perspective.

VI. Additional Information

A. Failed Components

None

B. Previous Similar Events

PG&E first identified and documented this design vulnerability in 1991 in Nonconformance Report DC0-91-EN-N028. A PG&E Technical Review Group determined that a postulated single, active failure of one of the redundant booster fans or booster fan dampers in the CRVS could potentially cause the CRVS to be outside its

design basis, as there was neither an alarm to notify control room operators of the failure nor an automatic switchover to the unaffected redundant CRVS train. In this situation, the potential existed for an undetected failure of a booster fan or damper during the pressurization Mode 4, resulting in infiltration of unfiltered airborne radioactivity into the control room. To correct the deficiency, PG&E installed ribbon-type streamers on the CRVS booster fan recirculation duct registers in the control room to enable control room operators to diagnose booster fan or its inlet damper status. Procedural guidance was provided in EOP E-0 to instruct the operators how to use the streamers to verify the proper operation of the booster fans while CRVS was in Mode 4.

C. Industry Reports

None

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NARRATIVE

CRVS Diagram