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August 22, 2013

PG&E Letter DCL-13-086

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

10 CFR 50.73

Docket No. 50-323, OL-DPR-82
Diablo Canyon Power Plant Unit 2
Licensee Event Report 2-2013-002-01, "Two Source Range Nuclear Instruments Inoperable While in Mode 6"

Dear Commissioners and Staff:

Pacific Gas and Electric Company (PG&E) submits the enclosed Licensee Event Report (LER) supplement regarding the Diablo Canyon Power Plant (DCPP) Unit 2 loss of two source range nuclear instruments while in Mode 6. PG&E is submitting this supplement to provide updated cause and corrective action information, following completion of an apparent cause evaluation and a vendor material analysis. This LER supplement is submitted in accordance with 10 CFR 50.73(a)(2)(v)(A).

PG&E makes no new or revised regulatory commitments (as defined by NEI 99-04) in this report. All the corrective actions identified in this letter were implemented in accordance with the DCPP Corrective Action Program.

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

Sincerely,

Barry S. Allen

dho6/50568303
Enclosure
cc/enc: Thomas R. Hipschman, NRC Senior Resident Inspector
Jennivine K. Rankin, NRR Project Manager
Steven A. Reynolds, Acting NRC Region IV
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

Two Source Range Nuclear Instruments Inoperable While in Mode 6

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
03	12	2013	2013	- 002 -	01	08	22	2013	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

6

10. POWER LEVEL

000

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

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☑ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Dean Overland, Senior Engineer, Regulatory Services	805-545-6038

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
B	IG	DET	W120	Y	B	IG	CBL	R352	Y

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 March 12, 2013, at 17:06 PDT, with Diablo Canyon Power Plant (DCPP) Unit 2 shut down for the Unit 2 Refueling Outage Cycle 17, Unit 2 source range (SR) instrument N-32 experienced an unexpected increase in indicated counts per second (cps). Other available SR indications showed no rise in cps. At the time, SR instrument N-31 was inoperable. Since operators considered N-32 inoperable while N-31 was already inoperable, the audible count rate in the control room was no longer reliable. DCPP determined this condition constituted a loss of a safety function required to maintain the reactor in a safe shutdown condition and was reportable in accordance with 10 CFR 50.73(a)(2)(v)(A).

Following a vendor failure analysis, DCPP determined that a discontinuity in the cable insulation shield caused the N-32 high count rate readings. DCPP replaced the faulted cable. This condition did not adversely affect the health and safety of the public.

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NARRATIVE

I. Plant Conditions

At the time of the event, Unit 2 was shut down for the Unit 2 Refueling Outage Cycle 17. No fuel movement was in progress.

II. Problem Description

A. Background

Two separate and independent channels of instrumentation [IG], N-31 and N-32, provide source range (SR) neutron flux measurement capability at Diablo Canyon Power Plant (DCPP). The installed SR measurement capability covers the range from approximately 10E-9 to 10E-3 percent power. The SR detectors [DET], preamplifier assemblies, and associated cabling [CBL] are designed to function in normal plant operating environments. This equipment is neither designed, nor required to be functional in an accident and/or a post-accident environment. The DCPP design also includes an independent Post Accident Monitoring System (PAMS)[IP]. PAMS channels N-51 and N-52 consist of wide-range neutron flux instruments and SR indications, N-53 and N-54, and PAMS performs the associated monitoring, indication, and assessment functions under post-accident conditions. PAMS measurement capability covers the range from approximately 10E-8 to 100 percent power.

Isolated analog output signals from the SR instrumentation drawers are sent to the Plant Process Computer (PPC) [10] for information, display, and trending purposes, as well as provide local indication on the control console. The SR instrumentation drawers also provide an input to a speaker [SPK] on the Audio Count Rate Drawer to provide an audio output for control room personnel and a High Flux at Shutdown alarm. These audible features provide operators prompt identification of unexpected changes in core [RCT] reactivity. This prompt identification is required to assure sufficient time for operator action to preclude progression of an unplanned reactivity addition event at low power. If the control room audible count rate is non-functional, both N-31 and N-32 must be declared inoperable, in accordance with Technical Specifications (TS) 3.9.3.

B. Event Description

On March 12, 2013, at 17:06 PDT, DCPP Unit 2 SR instrument N-32 experienced an unexpected increase in indicated counts per second (cps). Initial N-32 indications were about 8-10 cps. The increase in indicated cps caused a High Flux at Shutdown alarm [JA] in the control room [NA]. N-32 cps stabilized at about 100-140 cps. There were no abnormal indications on N-31, N-51, or N-52, and no fuel movement was in progress. Further inspection determined that slight movement of the N-32 signal cable produced repeatable upscale readings on the instrument. Operations declared N-32 inoperable, due to unreliable indication. Maintenance personnel concluded that the N-32 signal cable had an internal fault, and that they bumped it when performing approved maintenance on a different instrument cable. A vendor failure analysis, and subsequent apparent cause evaluation, determined that there was a discontinuity in the cable insulation shield, validating the initial conclusions.

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When this event occurred, N-51 was out of service for maintenance. The maintenance was complete and N-51 indication was normal, but the instrument was not yet declared operable. Additionally, N-31 was already inoperable. A leaking reactor cavity seal [SEAL] had introduced moisture, which caused unreliable instrument indication. However, at the time of the N-32 cps increase, N-31 indication was normal. Therefore, when operators declared N-32 inoperable while N-31 was already inoperable, the control room audible count rate indication was no longer reliable. DCPP determined this condition constituted a loss of a safety function required to maintain the reactor in a safe shutdown condition. On March 12, 2013, at 21:58 PDT, DCPP made an 8-hour nonemergency report (see NRC Event Number 48819) in accordance with 10 CFR 50.72(b)(3)(v)(A).

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

At the time of the event, Train A SR instrument N-31 was inoperable as a result of a leaking cavity seal that allowed moisture to cause unreliable indication. Cable testing confirmed insulation [INS] degradation and increased noise sensitivity. PAMS Channel A instrument N-51 was also inoperable for scheduled maintenance. The maintenance was complete and N-51 indication was normal, but the instrument was not yet declared operable.

D. Other Systems or Secondary Functions Affected

No other system or secondary function was affected.

E. Method of Discovery

The High Flux at Shutdown alarm, along with an increase in the audible count rate, sounded in the control room making operators immediately aware of the condition.

F. Operator Actions

Upon receiving the High Flux at Shutdown alarm, operators appropriately responded by entering alarm response Procedure AR PK03-07, "Hi Flux at Shutdn Alarm." This procedure directed operators to enter operating Procedure OP AP-33, "Uncontrolled Boron Dilution At Shutdown." Operators observed elevated N-32 counts, but no other signs of a reactivity addition event. Therefore, operators declared N-32 inoperable and appropriately exited AP-33. Operators entered TS 3.3.1, action statements L.1 and L.2, and TS 3.9.3, action statements A.l, A.2, B.1, and B.2.

G. Safety System Responses

This event did not initiate or require safety system responses.

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III. Cause of the Problem

DCPP determined that a discontinuity in the cable insulation shield caused the N-32 high count rate readings.

IV. Assessment of Safety Consequences

The SR instruments provide protection from a rapid reactivity addition event at low power. At the time of the event, Unit 2 was shut down with all control rods fully inserted and all reactor trip breakers [BKR] open. These conditions ensure that a rapid reactivity addition event would not occur. A boron dilution event is a slow-moving reactivity addition. Other control room indications provided operators with SR indication. N-52 was operable. N-51 and N-31 were both inoperable, but indicating correctly. Audible control room indication provided by N-31 was also functioning, but deemed unreliable. Additionally, operators subsequently set PPC alarms to provide an audible alert to any increase in SR power level. Given these conditions, the likelihood of an uncontrolled reactivity addition from a boron dilution accident had a low probability and therefore, the increase in risk is negligible.

V. Corrective Actions

A. Immediate Corrective Actions

DCPP established clearances to control sources of positive reactivity addition. Additionally, control room operators set PPC alarms to provide an audible alert to any increase in SR power level. These control room alarms served to replace the control room audible indication normally provided by the SR instruments.

B. Other Corrective Actions

DCPP replaced the faulted N-32 cable.

VI. Additional Information

A. Failed Components

At the time of the event, Train A SR instrument N-31 was inoperable as a result of a leaking cavity seal that allowed moisture to cause unreliable indication. Cable testing confirmed insulation degradation and increased noise sensitivity due to the moisture.

Train B SR instrument N-32 signal cable developed an internal fault. This fault caused unreliable indication that would vary when the N-32 signal cable was moved. This cable was previously tested on February 14, 2013, and showed no signs of an internal fault.

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NARRATIVE

B. Previous Similar Events

No previous similar events were identified.