



**Pacific Gas and  
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July 28, 2016

PG&E Letter DCL-16-075

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 2-2016-001-00, Reactor Trip Breakers Manually Opened During  
Shutdown Due to a Control Rod Movable Gripper Fuse Failure

Dear Commissioners and Staff,

Pacific Gas and Electric Company (PG&E) submits the enclosed Licensee Event Report (LER) regarding the reactor trip breakers manually being opened during shutdown due to a control rod movable gripper fuse failure. PG&E is submitting this LER in accordance with 10 CFR 50.73(a)(2)(iv)(A), as a system actuation of the reactor protection system.

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

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

Sincerely,

James M. Welsch

aph8/6470/50855643

Enclosure

cc/enc: Kriss M. Kennedy, NRC Region IV Administrator  
John P. Reynoso, NRC Acting Senior Resident Inspector  
Balwant K. Singal, NRR Senior Project Manager  
INPO  
Diablo Distribution



# **LICENSEE EVENT REPORT (LER)**

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form  
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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 and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [Infocollections.Resource@nrc.gov](mailto:Infocollections.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.

## **1. FACILITY NAME**

Diablo Canyon Power Plant, Unit 2

## **2. DOCKET NUMBER**

05000323

## **3. PAGE**

1 OF 5

## **4. TITLE**

Reactor Trip Breakers Manually Opened During Shutdown Due to a Control Rod Movable Gripper Fuse Failure

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
05	30	2016	2016	001	00	07	28	2016	FACILITY NAME	DOCKET NUMBER
										05000
									FACILITY NAME	DOCKET NUMBER
										05000

  

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
4	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
10. POWER LEVEL	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(i)
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(ii)
	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> OTHER	Specify in Abstract below or in NRC Form 366A	

## **12. LICENSEE CONTACT FOR THIS LER**

### **LICENSEE CONTACT**

Andrew Heffner, Regulatory Services Engineer

### **TELEPHONE NUMBER (Include Area Code)**

(805) 545-6470

## **13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
D	AA	FU	B569	No					

## **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 May 30, 2016, at 0930 PDT, with Unit 2 in Mode 4, "Hot Shutdown," licensed operators responding to a difference greater than 12 steps between digital rod position indication (DRPI) and demand position indication in the control room, manually opened the Reactor Trip Breakers in accordance with plant procedures. The plant operators stabilized the plant and technicians identified a failure of a control rod moveable gripper fuse. At 1611 PDT, plant operators made an 8-hour, nonemergency notification in accordance with 10 CFR 50.72(b)(3)(iv)(A). Plant technicians replaced the fuse and plant operators confirmed proper operation by performance of surveillance testing.

The cause was attributed to Surveillance Test Procedure (STP) R-1C, "Digital Rod Position Indicator Functional Test," which did not explicitly specify actions to identify improper DRPI indications prior to exceeding a 12-step difference between rod demand and rod position indication.

Corrective actions to prevent recurrence include revision of STP R-1C to include guidance regarding verification of rod motion prior to exceeding 12 steps and operator training of the changes to the procedure.

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



**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

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1. FACILITY NAME	2. DOCKET	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Diablo Canyon Power Plant, Unit 2	05000323	2016	- 001	- 00

**NARRATIVE****I. Reportable Event Classification**

This event is reportable pursuant to 10 CFR 50.73(a)(2)(iv)(A), System Actuation.

**II. Plant Conditions**

Unit 2 was in Mode 4, Hot Shutdown, preparing for restart following the nineteenth refueling outage (2R19).

**III. Description of Problem****A. Background**

The rod control system [AA] is a Design Class II system for positioning the reactor control rods for reactor power modulation by manual or automatic control of control rod banks. The rod control system is provided motive power through the redundant Design Class I Reactor Trip breakers that open to perform the safety-related function of rod insertion by removing all motive power to the control rod drive mechanism. The rod group demand position indication is located in the control room on the control board and indicates the individual rod position demands made for rod motion.

The digital rod position indication (DRPI) system measures the position of the control rod drive mechanism shafts within the control rod drive housings so that the positions of the control rods within the core are verified.

Equipment Control Guideline (ECG) 41.2, "Special Test Exceptions - Position Indication System - Shutdown", requires that position indication systems be operable when the reactor trip breakers are closed. With less than the above required position indication systems operable, the reactor trip breakers are required to be immediately opened. Surveillance Requirement (SR) 41.2.1 requires verification "that the demand position indication system and the DRPI system agree within 12 steps when rods are stationary."

Surveillance Test Procedure (STP) R-1C, "Digital Rod Position Indicator Functional Test," verifies the OPERABILITY of the DRPI System. The rod banks are individually withdrawn in 24 step increments while a comparison is made between the DRPI indication and the demand step counter for each rod. When the bank is fully withdrawn, it is then inserted to the rod bottom light emitting diode (LED) point and the position at which each rod bottom LED was actuated is recorded.

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**NARRATIVE****B. Event Description**

During plant restart following 2R19, plant operators initiated DRPI operability testing of Shutdown Bank A in accordance with STP R-1C.

On May 30, 2016, at 0930 PDT with Unit 2 in Mode 4, licensed operators responded to an indicated difference between the Rod B4 demand position indication and DRPI indication greater than 12 steps and initiated manual opening of the reactor trip breakers in accordance with plant procedures.

On May 30, 2016, at 1611 PDT, operations made an 8-hour, nonemergency notification in accordance with 10 CFR 50.72(b)(3)(iv)(A).

**C. Status of Inoperable Structures, Systems, or Components that Contributed to the Event**

Control rod moveable gripper fuse (FU49) for Rod B4 was open.

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

None.

**E. Method of Discovery**

The condition was discovered during the performance of STP R-1C as required by plant ECG 41.2.

**F. Operator Actions**

Licensed operators initiated manual opening of the reactor trip breakers removing motive power from the rod control system in accordance with plant procedures.

**G. Safety System Responses**

Unit 2 rod control system was deactivated by opening the reactor trip breakers, which deenergized the gripper circuits and control rods that were withdrawn then reinserted into the core as designed.



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**NARRATIVE****III. Cause of the Problem****A. Immediate Cause**

The rod control demand position indication and DRPI had an observed difference of 14 steps, requiring the immediate opening of the reactor trip breakers.

**B. Cause**

A failure of the Rod B4 moveable gripper fuse (FU49) prevented Rod B4 from movement upon demand. This caused the Rod B4 to remain at the core bottom as indicated by the DRPI system while the demand counter counted up to 14 steps.

Gripper coil fuses are replaced every refueling outage to prevent failure due to cyclic fatigue. Handling and installation stress can weaken fuses and cause them to fail when first energized. These issues are detected when post maintenance testing is performed.

STP R-1C, Revision 21, did not explicitly specify actions to identify improper DRPI indications prior to exceeding a 12 step difference between rod demand and rod position indication. STP R-1C, Revision 17, dated March 19, 2009, had steps to withdraw the rod bank to 10 steps and then check rod control fuse integrity. These steps were added to STP R-1C, as a corrective action to a previous Licensee Event Report (LER) 2-2003-004-00.

Subsequently, this step was removed in Revision 18 of the procedure dated July 14, 2009. If this step had been in STP R-1C at the time of the event, the faulted fuse would have been detected prior to exceeding the 12-step limit and a manual opening of the reactor trip breakers would not have been required.

**IV. Assessment of Safety Consequences**

Procedure controlled pre-operation testing discovered the inoperable system prior to pulling more than one shutdown bank. A control rod moveable gripper fuse (FU49) was identified as failed open preventing Rod B4 from being moved, thus, no unanticipated positive reactivity change was possible. At the time of this event, the boron concentration in the reactor coolant system was approximately 2100 ppm; therefore, compliance with shutdown margin requirements was maintained. This event was not safety significant and it did not adversely affect the health and safety of the public.

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**NARRATIVE****V. Corrective Actions****A. Immediate Corrective Actions**

- Unit 2 rod control system was deactivated by opening the reactor trip breakers, which deenergized the gripper circuits and control rods that were withdrawn then reinserted into the core as designed.
- Plant staff identified a failed moveable gripper coil fuse (FU49) for Rod B4 and replaced the failed fuse.

**B. Corrective Actions to Prevent Recurrence**

- STP R-1C has been revised to provide adequate guidance regarding confirmation of rod motion prior to exceeding 12 steps demand indication.
- Plant operators will receive training on the changes to STP R-1C.

**VI. Additional Information****A. Failed Components:**

Component: Fuse, 10A 250V ceramic cartridge  
Manufacturer: BUSSMANN # 2432B59

**B. Previous Similar Events**

LER 2-2003-004 included a manual reactor trip due to a single random failure of a Control Rod F2 moveable coil power supply fuse which caused Rod F2 to remain on the core bottom, as indicated by the DRPI system. Corrective actions included revising STP R-1C to provide adequate guidance regarding confirmation of rod motion prior to exceeding 12 steps demand indication. However, as noted above, these steps were inadvertently deleted in a subsequent revision to the procedure.