

November 22, 2006

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555-0001

Subject: **Docket No. 50-362**  
**Licensee Event Report No. 2006-004**  
**San Onofre Nuclear Generating Station, Unit 3**

Dear Sir or Madam:

This submittal provides Licensee Event Report (LER) 2006-004, which describes an occurrence of an inoperable breaker causing a charging pump to be inoperable longer than allowed by Technical Specifications. This event did not affect the health and safety of either plant personnel or the public.

If you require any additional information, please contact me.

Sincerely,

*Daniel P. Breig*

Unit 3 LER No. 2006-004

cc: B. S. Mallett, NRC Regional Administrator, Region IV  
C. C. Osterholtz, NRC Senior Resident Inspector, San Onofre Units 2 & 3

<b>1. FACILITY NAME</b> San Onofre Nuclear Generating Station (SONGS) Unit 3	<b>2. DOCKET NUMBER</b> 05000362	<b>3. PAGE</b> 1 OF 4
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**4. TITLE**  
Inoperable breaker causes train "A" charging pump to be inoperable for longer than allowed by Technical Specifications

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
09	27	2006	2006-004-00			11	22	2006		

9. OPERATING MODE	10. POWER LEVEL	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR : (Check all that apply)			
1	100	20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
		20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
		20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)
		20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
		20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	
		20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
		20.2203(a)(2)(v)	X 50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
		20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
		20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

**12. LICENSEE CONTACT FOR THIS LER**

NAME <b>D. P. Breig, Station Manager, Nuclear Generation</b>	TELEPHONE NUMBER (Include Area Code) <b>949-368-9263</b>
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**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	CB	BKR	ABB/ITE	Y					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b>	<b>15. EXPECTED SUBMISSION DATE</b>	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO			

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

On September 27, 2006 (discovery date) at approximately 0917 PDT, Unit 3 was operating at about 100 percent power when "A" train charging pump 3P190 failed to start. Upon investigation, SCE determined the pump failed to start because the supply breaker 3B0413 failed to close. Based on the cause analysis, SCE concluded the "A" train charging pump became inoperable when the breaker was last opened (September 23, 2006 at 1427 PDT). SCE is reporting this event in accordance with 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by the TS.

SCE determined that the supply breaker failed due to a failed shunt trip device (STD). The STD trip rod was sticking intermittently in the energized position, which prevented the breaker from closing. SCE replaced the STD in breaker 3B0413 and returned the pump to service on October 3, 2006. SCE is continuing to investigate the cause of the sticking STD. SCE plans to replace two other breaker operating mechanisms that were purchased in the same lot and that are installed in safety related applications.

The safety significance of this condition is minimal because the "B" train charging pump was operating and the swing charging pump was operable and available to be aligned to "A" train during the time the "A" train charging pump was inoperable.

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Plant: San Onofre Nuclear Generating Station (SONGS) Unit 3  
 Discovery Date: September 27, 2006  
 Reactor Vendor: Combustion Engineering  
 Mode: Mode 1 – Power Operation  
 Power: 100 percent

**Description of Event:**

San Onofre Nuclear Generating Station (SONGS) Technical Specification (TS) 3.1.9 requires two RCS boron injection [CB] flow paths (“A” and “B” train) to be operable in Modes 1 through 4. TS 3.1.10 requires one RCS boron injection flow path to be operable in Modes 5 and 6. Each flow path includes one charging pump. A third charging pump (swing) is capable of being aligned to either the “A” or “B” train flow path.

On September 27, 2006 (discovery date) at approximately 0917 PDT, Unit 3 was operating at about 100 percent power when “A” train charging pump 3P190 [P] was declared inoperable after failing to start and a 72 hour action statement was entered in accordance with TS 3.1.9. At that time, the “B” train charging pump was already operating and the swing charging pump was also aligned to “B” train. At 1607 PDT on September 27, 2006, plant operators aligned swing charging pump 3P191 to “A” train and the action statement was exited.

Upon investigation Southern California Edison (SCE) determined the “A” train charging pump failed to start because the shunt trip device (STD) on the ABB 480 V K600S supply breaker [BKR] 3B0413 failed, preventing the breaker from closing. Based on the cause analysis, discussed below, SCE concluded that the “A” train charging pump breaker became inoperable when the breaker was last opened on September 23, 2006 at 1427 PDT. The “A” train boration flow path was not restored to operable status until the swing charging pump was aligned to the “A” train on September 27, 2006 (4 days, 1 hour, and 42 minutes later). Because the period of inoperability exceeded the 72 hours allowed outage time, SCE is reporting this event in accordance with 10 CFR 50.73(a)(2)(i)(B).

**Cause of Event**

SCE determined the “A” train charging pump failed to start because the supply breaker failed to close on demand from the control room due to a failed STD in the breaker. The STD opens the breaker under conditions such as demand from the control room or automatic signals not associated with an electrical fault. The STD is similar to a spring return solenoid, which when energized momentarily with 125 Vdc, produces a magnetic force that pulls up on the armature. This movement causes the trip rod to actuate the primary trip latch to open the breaker. When the voltage is removed, the STD trip rod should return to its normal position by spring tension. If the STD trip rod does not return to the normal position, the primary trip latch will also remain actuated and prevent the breaker from closing. (See attached figure.)

SCE performed bench testing of the failed breaker and found the STD trip rod to be sticking intermittently in the energized position. SCE concluded the sticking STD had prevented the breaker from closing as described above. Because the STD only actuates when opening the breaker, this failure most likely occurred when the breaker was last opened. SCE is continuing to investigate the cause of the sticking STD.

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### Corrective Actions

SCE replaced the STD in breaker 3B0413 and returned the "A" train charging pump to service on October 3, 2006. The defective STD was returned to the manufacturer for failure analysis.

The STD is a subpart of the breaker operating mechanism. The STD in breaker 3B0413 was installed in the plant on February 26, 2003 when the operating mechanism for 3B0413 was replaced during a breaker overhaul. The breaker operated satisfactorily between the overhaul and its failure on September 23, 2006. SCE identified four other operating mechanisms with STDs installed at the factory that were purchased in the same lot as the operating mechanism in 3B0413. Of these four, only two are installed in safety related equipment (pressurizer heater bank 2E128 and standby upper dome air circulator 2A073). The following additional actions are planned:

- SCE plans to replace the two operating mechanisms purchased in the same lot that are installed in safety related applications. (The entire operating mechanism in 3B0413 was replaced following a subsequent failure discussed below in "Additional Information".)
- The 480 volt breaker preventive maintenance and overhaul procedures will be revised to require inspection of STDs for the condition discussed above.
- Based on the results of the cause analysis performed by the breaker supplier, SCE may determine other corrective actions.

### Safety Significance

The safety significance of this event was minimal because:

The "B" train charging pump was operating and the swing charging pump was operable and available to be aligned to "A" train during the time the "A" train charging pump was inoperable.

SCE performed a probabilistic risk assessment and demonstrated that the safety significance of this condition is minimal (increase in core damage probability of 6E-8 and increase in large early release probability of 6E-10) due to the short time the charging pump was inoperable and the availability of the "B" train and swing charging pumps.

### Additional Information

On October 17, 2006, Unit 3 was in Mode 5 at the beginning of the Cycle 14 refueling outage when "A" train charging pump breaker 3B0413 failed to open on demand from the control room. SCE had returned the breaker to service on October 3, 2006 and plant operators had started the pump four times and stopped it three times before the breaker failed again on October 17, 2006. The failure occurred in Mode 5 when only one boration injection flow path is required. At that time, "A" train charging pump was running and "B" train flow path was operable. SCE determined the second breaker failure was caused by mechanical jamming of the operating mechanism and was not related to the first failure caused by sticking of the STD. SCE is continuing to investigate the cause of the mechanical jamming of the operating mechanism.

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In the past three years, SCE has not reported any events involving inoperability of boration flow paths for longer than allowed by TSs. SCE did report the following three events involving breaker failures causing equipment to be inoperable for longer than allowed by TS:

- LER 2002-002, "Breaker failure to close renders containment emergency fan inoperable for longer than allowed by TS." This failure was caused by the inability of the closing springs for the breaker to fully charge through the end of the charge cycle.
- LER 2003-001, "Breaker failure coincident with planned maintenance results in both trains of Emergency Core Cooling System and Containment Spray being inoperable." The 480V feeder breaker unexpectedly opened due to an isolated spurious trip of a solid state trip device.
- LER 2005-005, "Inoperable class 1E supply breaker causes pressurizer heater to be inoperable for longer than allowed by TS." This failure was caused by misalignment and interferences between the breaker and the cubicle.

Because these earlier events were not caused by failure of a STD, prior corrective actions would not be expected to prevent the failure of the breaker reported in this LER.

**Shunt Trip Device for ABB K600S Breaker**

