

April 9, 2007

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

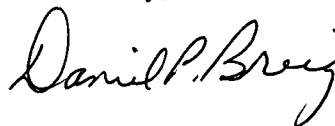
Subject: **Docket No. 50-362**  
**Licensee Event Report No. 2006-006**  
**San Onofre Nuclear Generating Station, Unit 3**

Dear Sir or Madam:

This submittal provides Licensee Event Report (LER) 2006-006, which reports an occurrence of one train of the Component Cooling Water system being 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,



Unit 3 LER No. 2006-006

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

<b>NRC FORM 366</b>  <b>U.S. NUCLEAR REGULATORY COMMISSION</b>  <b>LICENSEE EVENT REPORT (LER)</b> <small>(See reverse for required number of digits/characters for each block)</small>	APPROVED BY OMB: NO. 3150-0104 06/30/2007  <small>Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs@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 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.</small>	EXPIRES:
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<b>1. FACILITY NAME</b> <b>San Onofre Nuclear Generating Station (SONGS) Unit 3</b>	<b>2. DOCKET NUMBER</b> <b>05000362</b>	<b>3. PAGE</b> <b>1 OF 4</b>
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**4. TITLE**  
 One train of Component Cooling Water considered inoperable for longer than allowed by Technical Specification 3.7.7 due to gas entrainment.

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
12	15	2006	2006	006-00		4	9	2007	<b>SONGS Unit 2</b>	<b>05000361</b>
									FACILITY NAME	DOCKET NUMBER

<b>9. OPERATING MODE</b>	<b>1</b>	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR : (Check all that apply)</b>							
		<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)				
<b>10. POWER LEVEL</b>	<b>9.5</b>	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(x)				
		<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 73.71(a)(4)				
		<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(5)	<b>OTHER</b> <small>Specify in Abstract below or in NRC Form 366A</small>			
		<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)					
		<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)					
		<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(D)					
		<input type="checkbox"/> 20.2203(a)(2)(v)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(vii)					
		<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)					
		<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)(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>

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				15. EXPECTED SUBMISSION DATE		
YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				MONTH	DAY	YEAR

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

On February 9, 2007, SCE concluded that Unit 3 Train B Component Cooling Water (CCW) system may have been inoperable between November 24, 2006 and December 15, 2006 due to entrained gas. During this period, Unit 3 was being returned to service following a refueling outage.

Technical Specification (TS) 3.7.7 requires the CCW system to be operable in modes 1 through 4. Unit 3 entered Mode 4 on December 7, 2006. On December 15, 2006, with Unit 3 in Mode 1, plant operators vented CCW Train B returning Train B to operable status. Because this period exceeds the allowable out of service time limit of 72 hours as specified by TS 3.7.7, SCE is reporting this occurrence in accordance with 10CFR50.73(a)(2)(i)(B).

The source of the entrained gas is not yet fully understood and remains under investigation. SCE is continuing to vent the CCW system in both Units to ensure the systems remain operable.

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

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REV NO	
San Onofre Nuclear Generating Station (SONGS) Unit 3	05000362	2006	--006--	00	2 of 4

Plant: San Onofre Nuclear Generating Station (SONGS) Unit 3  
 Event Date: December 15, 2006  
 Reactor Vendor: Combustion Engineering  
 Mode: Mode 1 – Power Operation  
 Power: 0.95 percent

**A. BACKGROUND INFORMATION**

The Component Cooling Water [CC] (CCW) System consists of two independent critical trains and one non-critical loop (NCL). (Critical trains provide cooling for safety related equipment.) The non-critical loop can be aligned to either one of the critical loops. Each CCW train is provided with a dedicated pump and a surge tank. A third, swing pump is also provided and can be aligned to either CCW train. The surge tanks are pressurized with a nitrogen blanket.

Technical Specification (TS) 3.7.7, Component Cooling Water System, requires two trains of CCW to be operable when the plant is in Modes 1-4. When one train is inoperable, the TS require SCE to restore the inoperable train within 72 hours, or place the plant in Mode 3 within the following 6 hours and Mode 5 within 36 hours. TS Bases B3.7.7 states that in Modes 5 and 6, the operability requirements of the CCW System are determined by the systems it supports.

Consistent with 10 CFR 50, Appendix A, General Design Criteria (GDC) 2 and 44, the design basis of the CCW system includes the requirement to be capable of performing its safety function following a Design Basis Earthquake (DBE) concurrent with a single active failure.

**B. DESCRIPTION OF EVENT**

On March 8, 2006, during routine activities, engineering personnel observed unexpected changes in the Unit 2 CCW Train A surge tank level indication. SCE's troubleshooting efforts concluded surge tank fluctuations were being caused by entrained gas. SCE initiated periodic venting at Unit 2. At that time, SCE had not observed similar precursor events at Unit 3 and, therefore, believed Unit 3 was not affected. As a preventative measure, SCE initiated venting at Unit 3 as well. Venting history is provided in the Additional Information section.

On December 15, 2006, 120 gallons was vented from Unit 3 Train B return from the letdown heat exchanger. As a result, SCE contracted with outside consultants (Fauske and Associates) to analyze the potential effects of the gas on Unit 3 CCW system Train B.

SCE received the Fauske and Associates report on February 9, 2007 [Discovery date]. The consultants' report concluded that due to the location of the bubble, it could potentially migrate with the inadvertent opening of the letdown temperature control valve on the output of the letdown heat exchanger which varies CCW flow through the heat exchanger. They determined that should the following conditions occur:

- 1) Train B is aligned to the non-critical loop and
- 2) the non-critical loop becomes isolated and
- 3) the letdown temperature control valve fails fully open,

a gas volume of 120 gallons in Train B could result in a void fraction (VF) at the CCW pump suction of 9 percent for 3.5 seconds (the average VF would be about 6 percent for 7.5 seconds, which is the

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

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REV NO	
San Onofre Nuclear Generating Station (SONGS) Unit 3	05000362	2006	--006 --	00	3 of 4

time required for the void to travel through the pump). Generally accepted industry guidance indicates that a void fraction of about 5-6 percent would not permanently degrade pump performance. Because the calculated void fraction was outside the 5-6 percent range, SCE conservatively concluded that Unit 3 CCW Train B was inoperable from the time it was returned to service in Mode 6 following the cycle 14 refueling outage [November 24, 2006] through the initial start up in Mode 4 [December 7, 2006] until the system was vented [December 11 and December 15, 2006], about 21 days.

TS 3.7.7 requires the CCW system to be operable in modes 1 through 4. Unit 3 entered Mode 4 on December 7, 2006. On December 15, 2006, with Unit 3 in Mode 1, SCE vented CCW Train B returning Train B to operable status. Because this period (about 8 days) exceeds the allowable out of service time limit of TS 3.7.7, SCE is reporting this occurrence in accordance with 10CFR50.73(a)(2)(i)(B).

**Cause of the Event:**

The CCW system is a closed loop system, pressurized by a nitrogen blanket on the surge tank and treated with corrosion inhibitors. SCE believes gas in the system can most likely be attributed to one of three sources: absorption of the nitrogen blanket into the cooling water, air entrained when the system is open during maintenance, or as a product of a chemical reaction. SCE is investigating each of these sources but has not yet been able to determine definitively the source of the entrained gas and our investigation is ongoing.

**Corrective Actions:**

SCE has taken and is taking the following interim corrective actions:

1. Operating procedures have been changed to perform daily venting on both trains of Unit 3 and Train A of Unit 2. This action ensures that the systems remain operable. As a conservative measure, Unit 2 Train B is vented periodically.
2. Vent extensions are being added to better quantify venting amounts through a more standardized venting procedure.
3. SCE plans to revise the fill and vent procedure before the next planned outage on Unit 3.

SCE may identify and implement additional corrective actions.

**Safety Significance**

The SONGS Unit 3 Component Cooling Water system has two independent safety-related trains. During the time Train B CCW was declared inoperable, Train A remained operable. (Amounts vented from Train A were below the amounts determined to be of concern.) Therefore, Train A was available to provide a heat sink for the removal of process and operating heat from safety related components during a Design Basis Accident or transient.

An assessment of the incremental core damage probability (ICDP) and the incremental large early release probability (ILERP) for the inoperability of Train B CCW determined that the Unit 3 ICDP and ILERP were 5E-7 and 2E-8, respectively. Therefore the safety significance of this event was minimal. The assessment was based on the reported component unavailability and operating

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

1. FACILITY NAME <b>San Onofre Nuclear Generating Station (SONGS) Unit 3</b>	2. DOCKET NUMBER <b>05000362</b>	6. LER NUMBER			PAGE (3) <b>4 of 4</b>
		YEAR <b>2006</b>	SEQUENTIAL NUMBER <b>--006 --</b>	REV NO <b>00</b>	

conditions that existed from the time the train was declared operable on November 24, 2006 through the venting of gas on December 15, 2006.

Additional Information:

Although no abnormal CCW surge tank fluctuations had been observed prior to March 3, 2006, it is uncertain whether a similar condition occurred on Unit 3 or at some time in the past. The CCW system configuration has not been changed for many years. Consequently, it is possible that some gas accumulation has occurred in the past. Because it is not possible to quantify any gas volumes that might have accumulated, their potential effect on system operability cannot be assessed.

Venting History

Date	Unit 2 Train A	Unit 2 Train B	Unit 3 Train A	Unit 3 Train B
8/03/06-9/29/06	Periodic venting	Periodic venting	No venting	No venting
9/29/06-10/17/06			Periodic venting	Once (9/29/06)
10/16/06-10/24/06				No venting
10/25/06-11/09/06	Daily venting		Daily venting	
11/10/06-11/22/06			Refueling	Outage
11/23/06-12/15/06			Daily venting	No venting
12/15/06-2/28/07		Monthly venting		Daily venting

Previous Events:

In the past three years, SCE has not reported any occurrences where entrained gas caused a plant system to be considered inoperable.