

March 6, 2006

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

Subject: **Docket No. 50-361**  
**Licensee Event Report No. 2006-001**  
**San Onofre Nuclear Generating Station, Unit 2**

Dear Sir or Madam:

On January 11, 2006, Southern California Edison (SCE) provided a phone notification to the NRC for a condition that caused SCE to declare both trains of the Shutdown Cooling System (SDCS) inoperable at San Onofre Unit 2. SCE subsequently determined that both trains of the SDCS remained capable of performing their required function and a report to the NRC was not required.

The original phone report (Event No. 42252) was retracted by phone on March 3, 2006. SCE is providing this voluntary LER to document this condition and inform the NRC of the corrective actions taken.

If you require any additional information, please contact me.

Sincerely,

*Daniel P. Breig*

Unit 2 LER No. 2006-001

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

**LICENSEE EVENT REPORT (LER)**

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

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 E8), 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.

<b>1. FACILITY NAME</b> San Onofre Nuclear Generating Station (SONGS) Unit 2	<b>2. DOCKET NUMBER</b> 05000361	<b>3. PAGE</b> 1 OF 5
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**4. TITLE**  
Both trains of Shutdown Cooling Declared Inoperable Due to the Discovery of a Through Wall Pipe Crack in Common Header

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
01	11	2006	2006-001-00			03	06	2006	FACILITY NAME	DOCKET NUMBER

<b>9. OPERATING MODE</b>	5	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 191.16(b):</b> (Check all that apply)								
<b>10. POWER LEVEL</b>	0	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)	<input checked="" type="checkbox"/> OTHER Specify in Abstract below or in NRC Form 366A  Voluntary					
		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)	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)						

<b>12. LICENSEE CONTACT FOR THIS LER</b>					
NAME D. P. Breig, Station Manager, Nuclear Generation			TELEPHONE NUMBER (Include Area Code) 949-368-9263		

<b>13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT</b>									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

<b>14. SUPPLEMENTAL REPORT EXPECTED</b>				<b>16. EXPECTED SUBMISSION DATE</b>		
YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO		MONTH	DAY	YEAR

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

On January 11, 2006, while San Onofre Unit 2 was in Mode 5 at the beginning of a scheduled refueling outage, SCE determined the source of a leak in the Shutdown Cooling System (SDCS) to be a small through-wall crack in the common discharge header of the Low Pressure Safety Injection (LPSI) pumps. SCE operators declared both trains of the SDCS inoperable. This event was reported to the NRC at 1743 PST on January 11, 2006, (NRC Event Number 42252), in accordance with 10CFR50.72(b)(3)(v)(B) as a condition that might prevent the removal of residual heat.

Subsequently, SCE performed laboratory analysis of the affected pipe and confirmed the failure mechanism was high-cycle fatigue that initiated at a small weld discontinuity on the outside diameter surface of the LPSI discharge header pipe at the branch fitting that connects to a one-inch drain line. SCE is continuing to evaluate the cause of the high cycle fatigue.

Based on later test results and engineering analyses, SCE concluded the pipe was capable of performing its safety functions under design basis conditions. On March 3, 2006, SCE retracted the January 11, 2006 phone report (Event Number 42252). SCE is conservatively submitting this voluntary Licensee Event Report to document this condition and inform the NRC of the corrective actions taken and planned.

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Plant: San Onofre Nuclear Generating Station (SONGS) Unit 2  
 Discovery Date: January 11, 2006  
 Reactor Vendor: Combustion Engineering  
 Mode: Mode 5 – Cold Shutdown  
 Power: 0 percent

**Background:**

In Modes 1, 2, and 3 with pressurizer pressure greater than or equal to 400 psia, Technical Specification (TS) 3.5.2 requires two trains of Emergency Core Cooling System (ECCS) to be operable. At San Onofre Unit 2, the ECCS includes the Low Pressure Safety Injection (LPSI) [BP] system. The LPSI system also functions as part of the Shutdown Cooling System (SDCS) [BP] when the plant is in Modes 4 through 6. In Mode 4, TS 3.4.6 requires two loops (any combination of SDC loops and/or Reactor Coolant System (RCS) [AB] loops) to be operable and at least one loop in operation. In Mode 5 with the RCS loops filled, TS 3.4.7 requires one RCS loop or one SDC train to be in operation and a second SDC train or RCS loop to be operable. In Mode 5 with the RCS loops not filled, TS 3.4.8 requires two trains of SDCS to be operable and one train operating.

The LPSI/SDC system contains two trains, each with its own pump [P], but sharing a common discharge line. This common line is then split into four individual pathways; each provides a flow path to one of the four RCS cold legs (see attached diagram).

**Description of Event**

On January 8, 2006, San Onofre Nuclear Generating Station (SONGS) Unit 2 was in Mode 5 for the beginning of a scheduled refueling outage and the SDCS was in service. At about 2300 PST, plant operators discovered a small leak (about 10 drops per minute) from the LPSI pumps common discharge header. Since the piping was covered by insulation, the source of the leak could not be immediately identified.

On January 11, 2006, after removing the pipe insulation, SCE determined the source of the leak to be a small through-wall crack in the 8-inch LPSI system Class 2 pipe [PSP] at the toe of the weld to a 1-inch drain line, (just upstream of valve 2HV9328 [ISV] low pressure cold leg injection isolation valve for RCS branch line 2A). Since the crack was located in the common discharge header and could not be isolated, SCE declared both SDC trains inoperable. This action is consistent with the guidance in Regulatory Issue Summary (RIS) 2005-20, (Appendix C.12 of the NRC Inspection Manual Part 9900), which states in part,

“Upon discovery of leakage from a Class 1, 2, or 3 pressure boundary component (pipe wall, valve body, pump casing, etc.), the licensee must declare the component inoperable (...) Following the declaration of inoperability, the licensee may also decide to evaluate the structural integrity of leaking Class 2 or 3 moderate-energy piping using the criteria of Code Case N-513-1.”

On January 11, 2006 at 1743 PST, SCE conservatively reported this occurrence to the NRC (NRC Event Number 42252), in accordance with 10CFR50.72(b)(3)(v)(B) as a condition that could have prevented the removal of residual heat. On January 12, 2006, SCE completed an evaluation of the pipe using the criteria of American Society of Mechanical Engineers (ASME) Code Case N-513-1 and determined the pipe was operable for SDC functions provided the system temperature was maintained below 200 degrees F and below 275 psig as required by the ASME Code Case. Administrative controls were established by Operations to ensure these conditions were maintained.

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SCE also analyzed the pipe integrity at the design basis conditions and determined the pipe would have remained intact and that system leakage through the crack would have remained below the allowable system leak rate. Based on these results, SCE concluded that although the pipe was degraded, it was capable of performing its safety functions under design basis conditions.

Because the system was always capable of performing its safety function, SCE retracted the original phone report on March 3, 2006. SCE is submitting this follow-up Licensee Event Report (LER) to document this condition and inform the NRC of the corrective actions taken and planned.

### Cause of Event

Based on laboratory analysis, SCE determined the crack was caused by high cycle fatigue. The crack initiated at a small weld discontinuity on the outside diameter surface of the eight-inch LPSI discharge header pipe at a branch fitting that connects to a one-inch drain line. SCE is continuing to evaluate the cause of the high cycle fatigue (reference AR 060100463-12).

### Corrective Actions

SCE performed the following corrective actions:

- The plant was in Mode 5 with the loops not filled and one SDC train in service when the crack location was identified on January 11, 2006. As discussed above, SCE declared both trains of SDC inoperable, complied with the actions required by TS 3.4.8, and continued toward Mode 6.
- SCE performed an evaluation of the structural integrity of the affected pipe and concluded the pipe was operable for SDC functions, provided the system temperature was maintained below 200 degrees F and below 275 psig. SCE later performed a second evaluation that demonstrated the pipe was capable of performing its safety function under all design basis conditions.
- Until SCE was able to remove the SDC system from service (after the core was completely offloaded), administrative controls were established that ensured the conditions assumed in the ASME Code Case N-513-1 evaluation were maintained. The condition of the crack was assessed on a daily basis and no crack growth was observed.
- The affected section of pipe was replaced with new pipe and the cracked pipe was sent offsite for analysis.

The extent of condition investigation is ongoing. The following inspections have been completed or are planned as indicated:

- All accessible sections of Unit 2 SDC system were visually inspected for signs of pipe or weld leakage. No additional leakage was observed.
- A visual inspection of the equivalent branch line was performed in Unit 3 on January 12, 2006. No leakage was observed.
- SCE selected other welds susceptible to the same failure mechanism to be inspected. Eighty-six (86) welds in the SDC, LPSI, Containment Spray (CS), and Containment Penetration

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systems were inspected using dye penetrant (PT) and/or ultrasonic (UT) inspection techniques and no other cracks were found.

- SCE performed a PT examination of the equivalent branch line joint in Unit 3 and found no cracks.
- Further examinations are being planned for Unit 3.

Additional corrective actions will be implemented if they are identified.

**Safety Significance**

This event had minimal safety significance because:

Although SCE initially declared both trains of the SDC system inoperable, the system was later determined to be operable in Modes 5 and 6, in accordance with ASME Code Case N-513-1. Therefore, the SDC system was capable of performing its required safety function in its as-found condition.

SCE also determined the pipe was able to perform its safety function under design basis conditions in all Modes (1 – 6). Therefore, the safety significance of this event is minimal.

**Additional Information**

Previous occurrences: In January 2004, SCE discovered a crack on the letdown line of the Unit 3 regenerative heat exchanger. The cause of this crack was elevated vibration due to inadequate charging pump discharge pressure pulsation dampeners and a failed spring can. This event did not require a report to the NRC because the letdown system is isolable and TS leakage limits were not exceeded. Because the SDC/LPSI system pipe crack was not caused by inadequate dampening or a failed spring can, corrective actions for the January, 2004 event would not be expected to prevent this occurrence.

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### Low Pressure Safety Injection System & Shutdown Cooling System (Simplified Diagram)

