



Daniel P. Breig, P.E.
Station Manager
San Onofre

May 26, 2006

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

Subject: **Docket No. 50-362**
Licensee Event Report No. 2006-003
San Onofre Nuclear Generating Station, Unit 3

Dear Sir or Madam:

This submittal provides Licensee Event Report (LER) 2006-003 for a reactor coolant system pressure boundary leak caused by incomplete compression of a Mechanical Nozzle Seal Assembly Grafoil Seal. 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,

A handwritten signature in black ink that reads "Daniel P. Breig".

Unit 3 LER No. 2006-003

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

P.O. Box 128
San Clemente, CA 92674-0128
949-368-9263/PAX 89263
Fax 949-368-6183
breigdp@songs.sce.com

JE22

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 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.

1. FACILITY NAME San Onofre Nuclear Generating Station (SONGS) Unit 3	2. DOCKET NUMBER 05000362	3. PAGE 1 OF 4
---	-------------------------------------	--------------------------

4. TITLE
Reactor Coolant System Pressure Boundary Leak Caused by Incomplete Compression of a Mechanical Nozzle Seal Assembly Grafoil Seal.

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
03	29	2006	2006	003-00		05	26	2006		

9. OPERATING MODE 5	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR *: (Check all that apply)									
10. POWER LEVEL 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)		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 D. P. Breig, Station Manager, Nuclear Generation						TELEPHONE NUMBER (Include Area Code) 949-368-9263			

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
B	AB	PZR	Westinghouse	Y					

14. SUPPLEMENTAL REPORT EXPECTED					15. EXPECTED SUBMISSION DATE			
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 March 29, 2006, SCE initiated a controlled shutdown of Unit 3 in order to perform an inspection for a problem identified on Unit 2 (see LER 3-2006-002). At approximately 1450 PDT on March 29, 2006, with Unit 3 in Mode 4, SCE identified boric acid crystals on the Mechanical Nozzle Seal Assembly (MNSA) installed on the Unit 3 pressurizer Resistance Temperature Detector (RTD) mechanical nozzle. SCE inspected and confirmed RCS leakage past the MNSA seal and is reporting this occurrence in accordance with 10CFR50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications.

SCE concluded that the RCS leak was caused by (1) primary water stress corrosion cracking of the pressurizer nozzle and (2) incomplete compression of the MNSA grafoil seal when the MNSA was installed (March 1998).

SCE removed the leaking MNSA and repaired the nozzle with Inconel 690 material. In addition, the two remaining MNSAs at Unit 3 were removed and the nozzles replaced with Inconel 690 material. There are no MNSAs currently in use at San Onofre Unit 2 or Unit 3.

The safety significance of this event is minimal.

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	-003 -	00	2 of 4

Plant: San Onofre Nuclear Generating Station (SONGS) Unit 3
 Discovery Date: March 29, 2006
 Reactor Vendor: Combustion Engineering
 Mode: Mode 4 – Hot Shutdown
 Power: 0 percent

Background

Primary water stress corrosion cracking (PWSCC) of Alloy 600 causes nozzles [NZL] installed in Reactor Coolant System (RCS) [AB] piping and the pressurizer [PZR] to develop cracks. At SONGS, in some cases, cracking also resulted in very minor RCS leakage (reported to the NRC in LERs 3-1986-003, 2-1992-004, 3-1995-001, 3-1996-004, 3-1997-001, and 2-1997-004).

Southern California Edison (SCE) used Mechanical Nozzle Seal Assemblies (MNSAs) to address PWSCC at six locations in Unit 2 and three locations in Unit 3. Some of these were installed as a preventive measure even though the nozzles had no indication of leakage.

MNSAs were designed to provide an external seal for instrument nozzles and to prevent a nozzle from ejecting in the event of nozzle failure. A MNSA compresses a grafoil seal against the exterior of the vessel parent material and is held in place by four or six bolts threaded into shallow holes drilled into the vessel parent material around the subject nozzle (see attached diagram of a MNSA). This essentially moves the pressure boundary from the original nozzle weld to the grafoil seal.

As of March 2006, SCE had removed all Unit 2 MNSAs and replaced the nozzles with Inconel 690 material ("half-nozzle" repair technique). SONGS was planning to remove the remaining Unit 3 MNSAs and replace the nozzles during the upcoming Unit 3 Cycle 14 refueling outage (4Q 2006).

In Modes 1, 2, 3, and 4, Technical Specification (TS) 3.4.13 prohibits any pressure boundary leakage from the Reactor Coolant System (RCS). If pressure boundary leakage exists, SCE is required to place the Unit in Mode 3 within 6 hours and in Mode 5 within 36 hours. The TS basis includes leakage past a MNSA as RCS pressure boundary leakage.

Description of Event:

On March 29, 2006, SCE initiated a controlled shutdown of Unit 3 (see LER 3-2006-002). At approximately 1450 PDT on March 29, 2006, with Unit 3 in Mode 4, as part of the normal visual inspection for RCS leakage inside containment, SCE identified boric acid crystals on the MNSA seal installed on the Unit 3 pressurizer Resistance Temperature Detector (RTD) mechanical nozzle (3TE-0101). (This MNSA had been installed in March 1998 as a preventive measure as the nozzle had no indication of leakage at that time). Subsequently SCE inspected and removed the MNSA and confirmed RCS leakage past the MNSA seal. SCE repaired the nozzle by replacing it with Inconel 690 material ("half nozzle" repair technique).

SCE found no evidence of boric acid when this MNSA was last inspected on May 5, 2005. Based on radionuclide analysis, SCE determined that the nozzle began leaking approximately one year ago, and concluded that the MNSA began leaking some time after May 5, 2005 (and during Cycle 13 operation). Consequently, SCE is reporting this occurrence in accordance with 10CFR50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications.

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	-003 -	00	3 of 4

Cause of Event

The boric acid crystals on the exterior of the MNSA indicate that both the nozzle and the MNSA leaked.

SCE believes the pressurizer nozzle leak was caused by PWSCC. SCE performed eddy current examination of the pressurizer RTD nozzle and detected three axially oriented indications on the inside diameter approximately 13.5 inches inside the tube. The approximate length of the indications ranged from 0.25 to 0.50 inch. These results are indicative of PWSCC.

SCE concluded the MNSA seal leak was caused by incomplete compression of the grafoil seal when it was installed (March 1998). The incomplete compression was most likely due to the bolts not reaching a depth that would have compressed the seal to the designed values. This could have resulted from (1) the threaded holes not being machined deep enough, and/or (2) insufficient thread lubrication causing the bolts to indicate the required torque values prior to fully compressing the seal. SCE confirmed the MNSA was installed in accordance with the vendor's procedure; however, the procedure did not require verification of seal compression by direct measurement when this MNSA was installed.

In November 2000, SCE became aware that another nuclear plant experienced a MNSA that was installed in a "cocked" position. In response that event, the vendor improved their MNSA installation procedure to include a requirement to measure the gap between the lower flange and the vessel surface to verify seal compression (in addition to other procedure changes). SCE was aware of the procedure change and the new requirement to verify seal compression for MNSAs installed after the procedure revision date. SCE reviewed all SONGS MNSAs and concluded that only MNSA 3TE-0101 was vulnerable to cocking. In January 2001, SCE inspected 3TE-0101 and determined it was not cocked, but did not also verify MNSA seal compression. SCE now views this as a missed opportunity to correct this condition.

Corrective Actions

SCE performed the following corrective actions:

1. SCE removed the MNSA seal on the Unit 3 pressurizer RTD nozzle after performing inspections in an effort to determine the cause of the failed seal.
2. SCE examined the Unit 3 pressurizer RTD nozzle and repaired it with Inconel 690 material ("half nozzle" repair technique).
3. SCE removed the two remaining MNSA seals at SONGS Unit 3. Inspection of the seals indicated they had been installed with adequate compression of the grafoil seal. In addition, no indication of leakage was observed at the associated nozzles and eddy current examinations revealed no detectable indications of flaws. Nevertheless, SCE replaced the nozzles with Inconel 690 material ("half nozzle" repair technique).

Safety Significance

The safety significance of this event is minimal. MNSAs are designed and maintain the ability to prevent ejection of a nozzle even if a complete circumferential crack were to occur. They also are intended to provide a seal at the surface of the parent material to prevent leakage should a crack in

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	--003--	00	4 of 4

the nozzle propagate throughwall. In this case, the MNSA remained capable of performing its safety function of preventing nozzle ejection even though it did not provide a leak tight seal. SCE's RCS visual inspection program also provided identification of this nozzle leak.

Finally, the consequences of a postulated nozzle ejection would be bounded by the existing small break Loss of Coolant Accident evaluation in Chapter 15 of the Updated Final Safety Analysis Report for San Onofre Units 2 and 3.

Additional Information

Previous occurrences: SCE has not previously reported a failure of a MNSA to prevent leakage. As discussed above, SCE previously reported instances of RCS pressure boundary leaks at SONGS due to PWSCC (LERs 3-1986-003, 2-1992-004, 3-1995-001, 3-1996-004, 3-1997-001, and 2-1997-004).

Side Pressurizer RTD Mechanical Nozzle Seal Assembly

(for illustrative purposes only)

