

December 19, 2007

U.S. Nuclear Regulatory Commission
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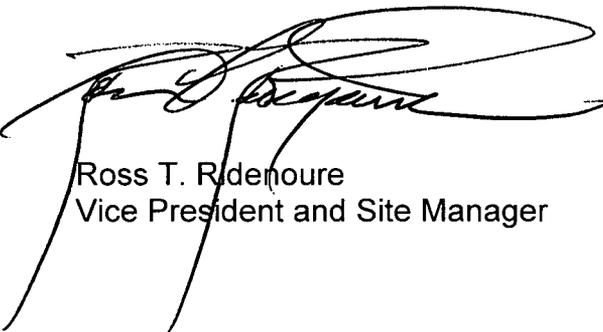
Subject: **Docket Nos. 50-361 and 50-362**
Licensee Event Report No. 2007-004
San Onofre Nuclear Generating Station, Units 2 and 3

Dear Sir or Madam:

This submittal provides Unit 3 Licensee Event Report (LER) 2007-004, reporting one Main Steam Isolation Valve, one Main Feedwater Isolation Valve and one Feedwater Block Valve being inoperable for longer than allowed by the 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,



Ross T. Ridenoure
Vice President and Site Manager

Units 2 and 3 LER No. 2007-004

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

NRC FORM 366 (9-2007)	U.S. NUCLEAR REGULATORY COMMISSION LICENSEE EVENT REPORT (LER) <small>(See reverse for required number of digits/characters for each block)</small>	APPROVED BY OMB: NO. 3150-0104 08/31/2010 <small>Estimated burden per response to comply with this mandatory information 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 Records and FOIA/Privacy service Branch (T-5F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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:																																				
1. FACILITY NAME San Onofre Nuclear Generating Station (SONGS) Unit 3		2. DOCKET NUMBER 05000362	3. PAGE 1 OF 4																																				
4. TITLE Technical Specification violation caused by moisture contamination in Hydraulic Dump Valve Solenoids																																							
5. EVENT DATE MO: 10 DAY: 18 YEAR: 2007			6. LER NUMBER YEAR: 2007 SEQUENTIAL NUMBER: 004 REV NO:																																				
7. REPORT DATE MO: 12 DAY: 19 YEAR: 2007			8. OTHER FACILITIES INVOLVED FACILITY NAME: SONGS Unit 2 DOCKET NUMBER: 05000361																																				
9. OPERATING MODE 5		11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR '': (Check all that apply)																																					
10. POWER LEVEL n/a		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:25%;">20.2201(b)</td> <td style="width:25%;">20.2203(a)(3)(ii)</td> <td style="width:25%;">50.73(a)(2)(ii)(B)</td> <td style="width:25%;">50.73(a)(2)(ix)(A)</td> </tr> <tr> <td>20.2201(d)</td> <td>20.2203(a)(4)</td> <td>50.73(a)(2)(iii)</td> <td>50.73(a)(2)(x)</td> </tr> <tr> <td>20.2203(a)(1)</td> <td>50.36(c)(1)(i)(A)</td> <td>50.73(a)(2)(iv)(A)</td> <td>73.71(a)(4)</td> </tr> <tr> <td>20.2203(a)(2)(i)</td> <td>50.36(c)(1)(ii)(A)</td> <td>50.73(a)(2)(v)(A)</td> <td>73.71(a)(5)</td> </tr> <tr> <td>20.2203(a)(2)(ii)</td> <td>50.36(c)(2)</td> <td>50.73(a)(2)(v)(B)</td> <td rowspan="5" style="text-align: center; vertical-align: middle;"> OTHER Specify in Abstract below or in NRC Form 366A </td> </tr> <tr> <td>20.2203(a)(2)(iii)</td> <td>50.46(a)(3)(ii)</td> <td>50.73(a)(2)(v)(C)</td> </tr> <tr> <td>20.2203(a)(2)(iv)</td> <td>50.73(a)(2)(i)(A)</td> <td>50.73(a)(2)(v)(D)</td> </tr> <tr> <td>20.2203(a)(2)(v)</td> <td><input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)</td> <td><input checked="" type="checkbox"/> 50.73(a)(2)(vii)</td> </tr> <tr> <td>20.2203(a)(2)(vi)</td> <td>50.73(a)(2)(i)(C)</td> <td>50.73(a)(2)(viii)(A)</td> </tr> <tr> <td>20.2203(a)(3)(i)</td> <td>50.73(a)(2)(ii)(A)</td> <td>50.73(a)(2)(viii)(B)</td> <td></td> </tr> </table>		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)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 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)	
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12. LICENSEE CONTACT FOR THIS LER																																							
NAME Ross Ridenoure, VP and Site Manager		TELEPHONE NUMBER (Include Area Code) 949-368-6255																																					
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																														
14. SUPPLEMENTAL REPORT EXPECTED						15. EXPECTED SUBMISSION DATE																																	
YES (If yes, complete EXPECTED SUBMISSION DATE)						MONTH DAY YEAR																																	
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16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)																																							
<p>On October 9, 2007, SCE initiated a shutdown of Unit 3 for a maintenance outage. During the shutdown, Unit 3 Main Feedwater Isolation Valve to Steam Generator (SG) E-088 and Main Feedwater Block Valve to SG E-089 failed to close. On October 18, 2007, during surveillance testing, the Main Steam Isolation Valve on SG E-089 failed to stroke closed when the train B Hydraulic Dump Valve (HDV) solenoids were de-energized (the valve stroked satisfactorily on the train A HDV).</p> <p>On October 20, 2007 (date of discovery), SCE determined the failure mechanism to be internal corrosion of the HDV solenoid valves due to moisture contamination at the HDV vendor. Consequently, SCE concluded the affected valves had been inoperable for longer than allowed by their applicable specification and is reporting these events under 10 CFR 50.73(a)(2)(i)(B) and 10CFR50.73(a)(2)(vii).</p> <p>SCE shutdown the operating unit (Unit 2) and tested other similar valves in both units and determined the remaining similar valves were operable. SCE replaced all of the contaminated solenoids in both Units.</p>																																							

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Plant: San Onofre Nuclear Generating Station (SONGS) Unit 3
 Event Date: October 18, 2007
 Reactor Vendor: Combustion Engineering
 Mode: Mode 5 – Cold Shutdown
 Power: n/a

Background

At San Onofre Nuclear Generating Station (SONGS) Units 2 and 3, the Main Steam Isolation Valves (MSIVs) isolate the Steam Generators during normal conditions and emergency conditions (Main Steam Line Break (MSLB)). MSIVs are held in the open position by a hydraulic system which exerts pressure on the bottom of a piston actuator. Nitrogen pressure on top of the piston actuator acts as a driving force for valve closure. To close the MSIVs, parallel redundant actuation hydraulic dump valves (HDV) open and dump hydraulic oil (Fyrquel) from the bottom of the piston. To be Operable, an MSIV must be able to close within its Technical Specification (TS) required response time (less than or equal to 8.0 seconds) and have two operable hydraulic oil dump valves (train A and train B). Each HDV has two normally energized closed pilot solenoids, both of which are required to open for a dump valve (and the MSIV) to be Operable (four solenoids total per MSIV). TS 3.7.2, Main Steam Isolation Valves, requires two MSIVs to be operable in Mode 1, and in Modes 2 and 3 except when the MSIVs are closed and deactivated. With one MSIV inoperable, Southern California Edison (SCE) is required to restore operability within 8 hours.

Main Feedwater Isolation Valves (MFIVs) isolate each Steam Generator (SG) during a MSLB or Main Feedwater Line Break (FWLB) accident. Main Feedwater Block Valves (FWBV), located upstream of the MFIVs, isolate the main feedwater lines to mitigate Secondary Line Break Accidents. The FWBV, and its parallel Feedwater Bypass Valve, close on receipt of a high containment pressure signal.

The two HDVs for the MFIVs and the single HDV for the FWBV are essentially the same as the HDVs on the MSIVs. To be Operable, an MFIV must be able to close within its TS required response time (less than or equal to 10 seconds). TS 3.7.3, Main Feedwater Isolation Valves, requires two MFIVs to be operable in Modes 1, 2 and 3 except when the MFIV is closed and deactivated. With one or more MFIVs inoperable, SCE is required to close or isolate the inoperable MFIV within 7 days and verify the inoperable valves is closed and isolated once every 7 days. Response time requirements and actions for the FWBV are listed in LCS 3.3.100.

B. DESCRIPTION OF EVENT

On October 9, 2007, SCE initiated a shutdown of Unit 3 for a maintenance outage. During the shutdown, Unit 3 Main Feedwater Isolation Valve to Steam Generator E-088 and Main Feedwater Block Valve to Steam Generator E-089 failed to close in the expected time on a close signal. SCE initiated a cause evaluation of these failures.

On October 18, 2007, during surveillance testing, the MSIV on Steam Generator E-089 failed to stroke closed when the train B HDV solenoids were de-energized (the valve stroked satisfactorily on the train A HDV).

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On October 20, 2007 (date of discovery), SCE determined the failure mechanism to be internal corrosion of the solenoid valves (see Cause of the Event below), which could affect multiple trains on both units. Therefore, SCE concluded that prior to the Unit 3 maintenance outage shutdown, the train B hydraulic path for MSIV closure was inoperable for longer than the 8 hours allowed by TS 3.7.2, the Main Feedwater Isolation Valve was inoperable for longer than the 7 days allowed by TS 3.7.3, and the MFBV was inoperable for longer than allowed by LCS 3.3.100.

SCE is reporting these occurrences in accordance with 10 CFR 50.73(a)(2)(i)(B), and 10CFR50.73(a)(2)(vii).

Cause of the Event:

The HDVs and their solenoid assemblies for the MSIVs, MFIVs, and the FWBVs at SONGS were supplied by Enertech. SCE also contracts with Enertech for HDV service and replacement. Between February 2006 and November 2006, obsolete solenoids (Fluid Controls 7WXP4774-500) were being replaced with a newer model solenoid (Sauer Danfoss D3908S) tested and provided by Enertech.

During refurbishment by Enertech, the HDVs were tested in the same type of hydraulic fluid (Fyrquel) used at SONGS. SCE and Enertech determined in our post-failure cause evaluation that the Fyrquel oil used during testing at the Enertech facility was contaminated with moisture. Moisture reacts with Fyrquel oil (phosphate ester) and in time forms phosphoric acid which corrodes the carbon steel parts of the HDV assemblies. The refurbished HDVs were shipped, stored, and installed at the SONGS site without removal of the moisture contaminated Fyrquel residue. Corrosion developed over time and resulted in the affected valves not stroking properly.

Corrective Actions:

SCE has completed the following interim corrective actions:

1. SCE identified similar HDVs installed in Unit 2 and conservatively shutdown Unit 2 to perform full stroke testing to verify Operability.
2. All MSIVs, MFIVs and FWBVs on both units were successfully stroked closed and met their required response times.
3. SCE replaced the affected solenoids at Unit 2 and Unit 3.
4. SCE removed solenoids from the SONGS warehouse that had been exposed to moisture contaminated Fyrquel.
5. Enertech reports they have changed their testing practices, initiated a 10 CFR Part 21 investigation and notified the NRC (Event number 43748).

SCE will complete the following corrective actions:

6. SCE will develop a program to ensure third party Repair, Refurbishment and Test Plans for Safety Related and critical components receive appropriate review.
7. SCE will review the storage of Fyrquel-exposed components at SONGS and modify SCE practices appropriately.

SCE may identify and implement additional corrective actions.

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Safety Significance:

On October 18, 2007, using the Unit 3 Train A HDV, the MSIV to Steam Generator E089 was stroked with an acceptable closure time of 6.9 seconds. Therefore, the MSIV was capable of performing its required safety function. This MSIV had been successfully stroke tested on both trains on November 26, 2006, during the last refueling outage for Unit 3.

An assessment of the incremental core damage probability (ICDP) and the incremental large early release probability (ILERP) for the October 18, 2007 MSIV dump valve solenoids failure determined the Unit 3 ICDP and ILERP were 1.6E-8 and 3.3E-9, respectively. The low risk significance assessed is mainly due to the fact that each MSIV has two trains of dump valves and only one has to operate for the MSIV to successfully close.

The failure to close of the MFIV in one feed line and the FWBV in the other line was evaluated and screened out due to its low risk significance. Their low risk significance is due to the very small likelihood of a steam line break occurring in a very specific location in combination with additional multiple component failures.

The UFSAR accident analyses were reviewed and found to remain acceptable with one MFIV inoperable, due to the presence of the functional FWBV in that line. The containment pressure and temperature response analysis is not affected by the failure of the MFIV, as the analysis bounds this condition.

Additional Information:

In the past three years, SCE has not reported any occurrences where valves failed to operate due to solenoid corrosion.