

December 10, 2010

10 CFR 50.73(a)(2)(v)(D)

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

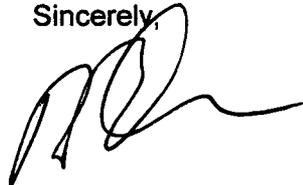
Subject: **Docket Nos. 50-361 and 50-362**  
**LER 2010-005-00, Refueling Water Storage Tank Alignment to**  
**Non-Seismic Purification Loop Results in Potential Loss of Safety**  
**Function**  
**San Onofre Nuclear Generating Station (SONGS), Units 2 and 3**

Dear Sir or Madam:

Attached is Licensee Event Report (LER) 2010-005-00, which is being submitted in accordance with 10 CFR 50.73(a)(2)(v)(D).

This letter does not contain any commitments. If you have any questions regarding the attached report, please call Ryan Treadway at 949-368-9985.

Sincerely,



Attachment: LER 2010-005-00

cc: E.E. Collins, Regional Administrator, NRC Region IV  
R. Hall, NRC Project Manager, SONGS Units 2 and 3  
G.G. Warnick, NRC Senior Resident Inspector, SONGS Units 2 and 3

**LICENSEE EVENT REPORT (LER)**

Estimated burden per response to comply with this mandatory 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 FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@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 an 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**  
Refueling Water Storage Tank Alignment to Non-Seismic Piping Results in Potential Loss of Safety Function

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	13	2010	2010	005-00		12	10	2010	SONGS Unit 3	05000362
									N/A	N/A

<b>9. OPERATING MODE</b>  1	<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)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)							
<b>10. POWER LEVEL</b>  94.8	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)							
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)							
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)							
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)							
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)							
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)							
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER								
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A								

**12. LICENSEE CONTACT FOR THIS LER**

<b>NAME</b> Douglas R. Bauder, Site Vice President and Station Manager	<b>TELEPHONE NUMBER (Include Area Code)</b> 949-368-9275
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**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
		N/A					N/A		

<b>14. SUPPLEMENTAL REPORT EXPECTED</b>				<b>15. EXPECTED SUBMISSION DATE</b>		
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE)				<input checked="" type="checkbox"/> NO		
				MONTH	DAY	YEAR

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

On 10/13/10 an engineering evaluation determined that San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 were periodically operated with the safety-related Seismic Category I (SC-I) Refueling Water Storage Tank (RWST) aligned to the nonsafety-related non-seismic purification loop piping in the Spent Fuel Pool Cooling and Cleanup System, potentially resulting in a loss of safety function. The isolation between the seismic and non-seismic piping is accomplished via a normally locked-closed manually-operated isolation valve S2(3)1204MU060 (MU060). If the non-seismic piping upstream of MU060 fails during a significant seismic event with the valve open, the safety-related SC-I return header to the RWST could be impacted post-accident, causing a reduction in RWST inventory and a potential diversion path from the Emergency Core Cooling System mini-flow line through the failed return piping. Since MU060 was periodically maintained in the open position during RWST purification activities in operating Modes 1 through 4, and there were no specific controls in place to close the valve following a seismic event or safety injection signal, the plant was in a condition which could have prevented the fulfillment of a safety function required for mitigation of a Design Basis Accident. Immediate corrective action was to close the valves on both Units 2 and 3 pending further evaluation.

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### A. REPORTABLE OCCURRENCE

On October 13, 2010, an engineering evaluation determined that San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 were periodically operated with the safety-related Seismic Category I (SC-I) Refueling Water Storage Tank (RWST) [TK] aligned to the nonsafety-related non-seismic purification loop piping in the Spent Fuel Pool (SFP) Cooling and Cleanup System (SFPCCS) [DA], potentially resulting in a loss of safety function. The isolation between the seismic and non-seismic piping is accomplished via a normally locked-closed manually-operated isolation valve S2(3)1204MU060 (MU060) [ISV]. If the non-seismic piping upstream of MU060 fails during a significant seismic event with the valve open, the safety-related SC-I return header to the RWST could be impacted post-accident, causing a reduction in RWST inventory and a potential diversion path from the Emergency Core Cooling System (ECCS) [BQ] mini-flow line through the failed return piping. This condition could have prevented the fulfillment of a safety function required for mitigation of a Design Basis Accident (DBA) and is reportable pursuant to 10 CFR 50.73(a)(2)(v)(D).

### B. INITIAL CONDITIONS

At the time of discovery on October 13, 2010, SONGS Unit 2 was in Mode 1 with reactor power at approximately 94.8 percent power, and SONGS Unit 3 was in a refueling outage with the plant in Mode 5 (cold shutdown). Unit 2 was at a reduced power condition due to a failed heater drain pump motor not associated with this event. There were no additional inoperable structures, systems, or components at the start of the event that contributed to this event.

### C. DESCRIPTION OF OCCURRENCE

On October 13, 2010, Engineering determined that SONGS Units 2 and 3 were periodically operated with the safety-related SC-I RWST aligned to the nonsafety-related non-seismic purification loop piping in the SFPCCS, potentially resulting in a loss of safety function. In accordance with Technical Specification 3.5.4, Refueling Water Storage Tank (RWST), in operating Modes 1, 2, 3, and 4, the RWST must be OPERABLE with a specified minimum number of gallons above the ECCS connection, in order to support operation of the ECCS and the Containment Spray System. Alignment of the RWST to the purification loop piping may render the RWST inoperable due to reduced inventory, potentially impacting mitigation of a DBA.

SONGS Units 2 and 3 each have a single SFPCCS. Portions of the SFPCCS are non-seismic and are cross-connected to the SC-I RWST for certain plant alignments (normal makeup flow path, RWST recirculation, RWST purification). During review of recent operating experience and SONGS design and licensing basis, it was determined that prior documented analysis was inadequate to support these alignments at SONGS.

The Spent fuel Pool (SFP) makeup flow path alignment is explicitly described in SONGS Updated Final Safety Analysis Report (UFSAR) Section 9.1.3.3, Safety Evaluation, as follows: "Makeup to the spent fuel pool is from the cross-connected Seismic Category I refueling water storage tanks. The normal makeup path is from the refueling water storage tanks via the spent fuel pool makeup pump to the pool." In

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addition, Section 12.5.3.5.1, Refueling, states: "Prior to refueling, water in the refueling water storage tank is purified, using a demineralizer and/or filter to reduce the amount of activity in the water that will be pumped to the refueling canal." These flow paths directly align the seismically qualified RWST with the non-seismic piping in the SFP purification flow path, but details are not provided regarding allowed duration or operating modes for the alignments.

The alignments for RWST recirculation and RWST purification are described below.

In accordance with plant procedures, the RWST recirculation flow path aligns the SC-I RWST to the suction of the SFP makeup pump (MP011) via an isolation valve S2(3)1219MU070 (MU070). Although the non-seismic SFP makeup piping from valve MU070 to pump MP011 is not classified as SC-I, it was designed and constructed equivalent to seismic qualification and therefore not subject to pipe failure in a seismic event. MU070 is normally open with the RWST recirculation flow path continuously aligned. In the case of a RWST level low alarm, plant alarm response procedures require operations to manually secure MP011 and close MU070.

With MU070 open, the SFP makeup flow path for RWST purification aligns the RWST to the non-seismic SFP purification piping through a SFP ion exchanger, and returning to the RWST via a manual normally locked closed isolation valve (MU060). MU060 is on the Safety Injection Tank drain line to the RWST; this line enters the top of the RWST above the RWST water level. A mini-flow line from the ECCS pumps is located on the return header between MU060 and the RWST. This RWST purification flow path is typically aligned prior to and following a plant refueling outage for a duration of approximately 14 to 41 days per year per unit (since 2007). The alignment is performed in accordance with plant procedures; however, no specific controls were in place to close MU060 following a seismic event or safety injection signal.

The RWST recirculation and RWST purification alignments described above were first established in 1982 during licensing of SONGS Unit 2. From 1989 to 1995, several evaluations concluded that the recirculation alignment was acceptable with MU070 open, crediting manual operator action in response to a loss of RWST volume. In 1995, plant drawings were formally revised to change MU070 from normally closed to normally open. The drawing change was thought to not constitute a design change at that time, and a license amendment and prior NRC approval was not considered necessary. The evaluation associated with the change concluded that sufficient time existed for operators to take appropriate manual actions per operating instructions and alarm response procedures in the case of RWST low level. In 2001, MU070 was added to the In-Service Testing (IST) program to ensure this boundary valve could be closed in the case of RWST leakage.

Although a potential SFP makeup pump MP011 suction line failure was addressed in the 1995 evaluation, the non-seismic purification piping upstream of MU060 through the SFP ion exchanger had not been addressed. Subsequent investigation determined that all piping except the SFP ion exchanger (SC-II) is classified SC-I or equivalent (SC-II/I) and therefore not subject to pipe failure in a seismic event. If the non-seismic SC-II piping upstream of MU060 fails during a significant seismic event with the valve open, the safety-related SC-I return header to the RWST would be impacted post-accident, causing a reduction in RWST inventory and a potential diversion path from the ECCS mini-flow line through the failed return piping. Therefore, alignment of the RWST to the purification loop piping in operating Modes 1, 2, 3, and 4, may render the RWST inoperable per Technical Specifications 3.5.4, potentially impacting mitigation of a

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DBA. There are no similar concerns in operating Modes 5 or 6.

Upon discovery of the deficiencies described above, SONGS Units 2 and 3 isolation valves MU060 and MU070 were administratively controlled in the closed position pending resolution.

**D. APPARENT CAUSE**

The causes of this event include past weaknesses in the processes for revising procedures and drawings, and performing design changes; and inadequate understanding, assessment, and documentation of the impact of the SFPCCS alignment changes on licensing and design basis requirements during the time period from 1982 through 1995. In addition, ineffective review of related industry operating experience since 1996 may have delayed discovery of the deficiencies.

**E. CORRECTIVE ACTIONS**

Immediate Corrective Actions – Nuclear Notification 201135761 was generated on October 1, 2010, to evaluate the identified problems. SONGS Units 2 and 3 isolation valves MU060 and MU070 were administratively controlled in the closed position.

Long Term Corrective Actions - The various options for properly aligning the RWST for recirculation or purification activities are being evaluated. Nuclear Notification 201181704 was written to perform a cause evaluation, and will address additional corrective actions.

**F. SAFETY ASSESSMENT**

There was no safety significance attributed to the RWST recirculation alignment with MU070 normally open, since all piping was determined to be classified as SC-I or equivalent (SC-II/I) and is not subject to failure in a seismic event. The safety significance for the RWST purification alignment with MU060 open was evaluated by considering both the actual and potential safety significance. There was no actual safety significance since there has been no demand for the RWST with a loss of integrity of the purification loop. In terms of potential safety significance, if the non-seismic piping upstream of MU060 fails during a significant seismic event with the valve open, the safety-related SC-I return header to the RWST would be impacted post-accident. This would cause a reduction in RWST inventory and a potential diversion path from the ECCS mini-flow line through the failed return piping. Since MU060 was periodically maintained in the open position during RWST purification activities in operating Modes 1 through 4, and there were no controls in place to close the valve following a seismic event or safety injection signal, the plant was in a condition which could have prevented the fulfillment of a safety function required for mitigation of a Design Basis Accident.

The incremental core damage probability (ICDP) and incremental large early release probability (ILERP) due to the potential impact of the RWST flow diversion following a seismic event are calculated to be 7.6E-7 and 4.5E-8, respectively. These probabilities are based on the longest exposure time of 41 days per calendar year for Unit 3 in 2008. This is a small risk increase mainly due to the relatively short duration the RWST is connected to SFPCCS, the small leakage rate for RWST (that provides a long time to recover from the event), and relatively low likelihood of seismic-induced events requiring RWST inventory.

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**G. ADDITIONAL INFORMATION**

Previous Similar Events - There have been no similar reportable events in the past three years at SONGS with the same underlying cause. However, there have been several similar events (RWST aligned to the non-seismic purification loop) at other nuclear plants documented as industry operating experience since 1996.