

10 CFR 50.73 (a)(2)(ii)(B)

March 15, 2011

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

Subject: **Docket Nos. 50-361, 50-362**
Licensee Event Report No. 2-2011-001
San Onofre Nuclear Generating Station, Units 2 and 3

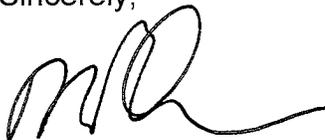
Dear Sir or Madam:

This submittal provides Licensee Event Report (LER) 2-2011-001 to report an alignment of non-Class 1E 6.9 KV AC electrical systems that had a potential to affect the assumptions of the Safety Analysis Report.

No violation of the Technical Specifications occurred. Neither the health nor safety of plant personnel or the public was affected by this occurrence.

If you require any additional information, please contact me.

Sincerely,



Unit 2 LER No. 2011-001

cc: E. E. Collins, NRC Regional Administrator, Region IV
G. G. Warnick, NRC Senior Resident Inspector, San Onofre Units 2 & 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.

1. FACILITY NAME San Onofre Nuclear Generating Station (SONGS) Unit 2	2. DOCKET NUMBER 05000361	3. PAGE 1 of 4
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4. TITLE
Non-Class 1E 6.9 kV Electrical System Shared Between Units Affects Safety Analysis Report

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
1	14	11	2011	001-00		03	15	11	SONGS Unit 3	05000362
									N/A	N/A

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: <i>(Check all that apply)</i>			
10. POWER LEVEL 100%	<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)
	<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 checked="" 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 type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

NAME Douglas R. Bauder, Site Vice President and Station Manager	TELEPHONE NUMBER (Include Area Code) 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		

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES <i>(If yes, complete 15. EXPECTED SUBMISSION DATE)</i> <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
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ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On January 14, 2011, SCE identified the electrical alignment of the non-Class 1E 6.9 kV electrical system at SONGS was shared between Units 2 and 3 during two recent refueling outages without an adequate evaluation that considered the impact on the UFSAR Chapter 15 safety analyses. This alignment was considered during the original design of the plant and is allowed in accordance with UFSAR Section 8.3.1 "AC Power Systems" and station operating procedures, but did not consider General Design Criterion 5.

The 6.9 kV busses supply the Reactor Coolant Pumps (RCPs) and automatically transfer to off-site power on a loss of main generator output. In October, 2010, with both units in Mode 1, the Unit 2 off-site 6.9 kV source was redirected to Unit 3 for maintenance on the Unit 3 transformer. If Unit 2 had tripped, the RCPs would have lost power, resulting in a natural circulation cooldown; Unit 3 would not have been affected. A similar alignment was established in 2009 during the Unit 2 outage. The alignment had a potential to more than minimally increase the probability of the Loss of Forced Flow event and increase the consequences of other UFSAR Chapter 15 events. Corrective action was to restrict use of the cross connection to a shutdown unit to maintain power to the operating unit RCPs. During the brief period the 6.9 kV system was shared the RCPs remained operable and the significance of the event was determined to be minimal.

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A. REPORTABLE OCCURRENCE

On January 14, 2011, SCE identified the electrical alignment of the non-Class 1E 6.9 kV electrical system at SONGS was shared between Units 2 and 3 during two recent refueling outages without an adequate evaluation that considered the impact on the UFSAR Chapter 15 safety analyses. This alignment was considered during the original design of the plant and is allowed in accordance with UFSAR Section 8.3.1 "AC Power Systems" and station operating procedures, but did not consider General Design Criterion 5.

The 6.9 kV busses supply the Reactor Coolant Pumps (RCPs) [P] and are normally aligned to the output of the main generator. The 6.9 kV busses automatically transfer to off-site power on a loss of power from the main generator, as described in the SONGS 2/3 Updated Final Safety Analysis Report (UFSAR). With both units at power, the Unit 2 off-site 6.9 kV source was redirected to Unit 3 to support maintenance on the Unit 3 transformer. If Unit 2 had tripped, the RCPs would have lost power, resulting in a natural circulation cooldown; Unit 3 would not have been affected. A similar configuration was established in 2009 during the Unit 2 Cycle 16 refueling outage, when the Unit 2 6.9 kV busses were aligned to Unit 3.

During the brief period the non-Class 1E 6.9 kV busses were aligned through a single unit, there was a potential for more than a minimal increase in the probability or consequences of previously evaluated transient analysis events. The event is being reported under 10 CFR 50.73 (a)(2)(ii) (B) "Any event or condition that resulted in the nuclear power plant being in an unanalyzed condition that significantly degraded plant safety."

B. INITIAL CONDITIONS

At the time of discovery on January 14, 2011, SONGS Unit 2 was in Mode 1 with the reactor at approximately 100 percent power, and SONGS Unit 3 was in the Cycle 16 Steam Generator Replacement refueling outage with the plant in Mode 5 (cold shutdown). The issue was identified through engineering reviews of a request to change the protective interlocks on the 6.9 kV system in support of RCP operation for startup from the Unit 3 Cycle 16 refueling outage.

There were two instances found in the past three year reporting period when the non-Class 1E 6.9 kV system was shared between the units to support maintenance. At the time of each occurrence, both units were in Mode 1.

C. DESCRIPTION OF OCCURRENCE

Each SONGS unit has four RCPs circulating water through the Reactor Coolant System (RCS), transferring the heat from the reactor to the steam generators. The RCPs continue to operate as the reactor is shutting down for decay heat removal. Should the RCPs lose power, 'natural circulation' flow through the RCS, driven by the temperature difference across the steam generators, is also sufficient to remove the decay heat. Forced circulation of the RCS is not credited, nor required for accident mitigation, allowing the RCPs and associated power supplies to be designed as non-Class 1E components.

The four RCPs on each unit are powered from two non-Class 1E 6.9 kV AC electrical busses, with each bus supplying two RCPs. The two 6.9 kV busses on each unit are normally supplied by the Unit Auxiliary Transformer (UAT) from the output of the main generator. Alternately, the 6.9 kV busses may be supplied from the switchyard off-site power source through the Reserve Auxiliary Transformer (RAT) on each unit. Each RAT has two windings, and each winding can supply one 6.9 kV bus.

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In the event of a main generator trip or failure, a fast transfer scheme automatically switches the 6.9 kV busses from the main generator output to the available off-site source. The design allows off-site power to be automatically provided from either unit to maintain power to the RCPs. Protective interlocks prevent placing more than a single 6.9kV bus on the reserve transformer winding. Consequently, when a 6.9 kV bus supplied from the main generator loses power, the RCPs will trip if the off-site power at that unit has been connected to supply the 6.9 kV bus on the other unit.

Preceding the Unit 2 and Unit 3 Cycle 16 refueling outages, the 6.9 kV busses were realigned from the normal main generator output to off-site power supply on the opposite unit to start scheduled maintenance on the reserve transformer before shutting the units down for the refueling outage. There were two occurrences:

On September 26, 2009, with Unit 2 at 99 percent power, and Unit 3 at 100 percent power, at approximately 1340 PDT, the Unit 2 6.9 kV busses were transferred to the Unit 3 RAT. At 2358 PDT, the Unit 2 reactor was shutdown for the refueling outage. Unit 2 entered Mode 4 on September 27, 2009, at 0606 PDT, and Mode 5 on September 28, 2009, at 0240 PDT. The Unit 2 RCPs were secured and the 6.9 kV busses were de-energized on September 29, 2009, at 0154 PDT.

On October 9, 2010, with Unit 3 at 82 percent power and Unit 2 at 94 percent power, at approximately 2158 PDT the Unit 3 6.9 kV busses were transferred to the Unit 2 RAT. On October 10, 2010, at approximately 0126 PDT, the Unit 3 reactor was shutdown for the refueling outage. Unit 3 entered Mode 4 on October 10, 2010, at 1505 PDT, and Mode 5 on October 11, 2010, at 0447 PDT. The Unit 3 RCPs were secured and the 6.9 kV busses de-energized on October 12, 2010, at 1110 PDT.

The configuration did not violate the Technical Specifications, which, in summary, require operation of the RCPs in Mode 1 until the Shutdown Cooling System is in operation.

D. APPARENT CAUSE

The ability to cross connect the non-Class 1E 6.9 kV busses between the units is part of the original plant design as described in UFSAR Section 8.3.1.1.1, "Non-Class 1E AC System," and was implemented through the plant procedures. In the event of an electrical failure, a loss of generation, or a failure of an off-site power source, the design provides the ability to retain power to the RCPs on both units. However, with the electrical distribution system of a single unit carrying the 6.9 kV busses for both units, a generator trip would result in the loss of forced coolant flow on that unit. The alignment of the 6.9 kV cross connection for normal operation, such as maintenance, would initiate natural circulation conditions for a routine plant trip. The SONGS UFSAR Section 15.3 classifies the "Total Loss of Reactor Coolant Forced Flow," as an Infrequent Incident. The loss of forced reactor coolant circulation upon plant trip would result in more than a minimal increase in the probability or consequences of previously evaluated UFSAR Chapter 15 "Accident Analysis" events.

The Loss of Forced Reactor Coolant Flow event is one of several infrequent category events evaluated in the UFSAR as a concurrent single failure of an active component. The analysis for some of the infrequent events, notably the Increase in Main Steam Flow with a Concurrent Single Failure of an Active Component, indicates fuel damage may result. With a loss of forced reactor coolant flow occurring as a direct result of a

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plant trip (i.e., no additional failure), these events shift to the moderate frequency category, for which the Standard Review Plan does not allow fuel damage.

10 CFR 50 Appendix A, General Design Criteria (GDC) 5 "Sharing of Structures, Systems and Components," requires that the sharing of systems does not prevent an orderly cooldown and shutdown of one unit given an accident in the other unit.

The SONGS UFSAR identified the shared systems between Units 2 and 3 in Appendix 3B Table 3B-1, concluding "No shared system or failure of a shared system will impair the capability to safely shut down and cool down either or both units." Table 3B-1 does not include the non-Class 1E 6.9 kV AC system that may be shared between Units 2 and 3. As such, neither SCE, nor the NRC, evaluated the non-Class 1E 6.9 kV system with respect to GDC 5. Because GDC 5 was not considered in the design of the non-Class 1E 6.9 kV system, the electrical power for the RCPs with respect to GDC 5 was not evaluated, and the impact to UFSAR Chapter 15 safety analyses was not recognized.

E. CORRECTIVE ACTIONS

Immediate Corrective Actions - Operating procedure changes were implemented to restrict alignment of the 6.9 kV electrical busses between the units to periods when the opposite unit is shutdown (Modes 5, 6, or defueled).

Long Term Corrective Actions - None are required, the existing condition was corrected.

F. SAFETY ASSESSMENT

Sharing the non-Class 1E 6.9 kV AC busses between the units did not result in an actual loss of forced circulation flow, and was of minimal safety significance. The duration of the cross connection of the 6.9 kV busses during the past three years was limited to a brief period when the busses were aligned to permit maintenance of the Reserve Auxiliary Transformers. The short period of time the 6.9 kV busses were shared between units (total of 2.6 days) resulted in a very small increased risk. The Incremental Core Damage Probability (ICDP) and Incremental Large Early Release Probability (ILERP) due to loss of 6.9 kV power to RCPs following a reactor trip were calculated to be 7.1E-10 and 1.3E-9, respectively.

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, nor have similar events caused by sharing a non-Class 1E electrical system been reported as industry operating experience.