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September 18, 2006

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

Subject: **Docket No. 50-361**
Licensee Event Report No. 2006-003
San Onofre Nuclear Generating Station, Unit 2

Dear Sir or Madam:

This submittal provides Licensee Event Report (LER) 2006-003 for a potential Emergency Diesel Generator trip after a seismic event due to an electrical ground fault in a non-seismic load. 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,

Unit 2 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

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NRC FORM 366 (7-2001)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB: NO. 3150-0104 <small>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.</small>		EXPIRES: 06/30/2007		
LICENSEE EVENT REPORT (LER) <small>(See reverse for required number of digits/characters for each block)</small>								
1. FACILITY NAME				2. DOCKET NUMBER		3. PAGE		
San Onofre Nuclear Generating Station (SONGS) Unit 2				05000361		1 OF 4		
4. TITLE								
Potential emergency diesel generator trip after a seismic event due to an electrical ground fault in a non-seismic circuit								
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE		
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR
07	20	2006	2006-003-00			09	18	2006
8. OTHER FACILITIES INVOLVED								
FACILITY NAME				DOCKET NUMBER				
SONGS Unit 3				05000362				
FACILITY NAME				DOCKET NUMBER				
9. OPERATING MODE								
1								
10. POWER LEVEL								
99								
11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR *: (Check all that apply)								
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)		X 50.73(a)(2)(v)(A)		73.71(a)(5)		
20.2203(a)(2)(ii)		50.36(c)(2)		X 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)		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				TELEPHONE NUMBER (Include Area Code)				
D. P. Breig, Station Manager, Nuclear Generation				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	
14. SUPPLEMENTAL REPORT EXPECTED					15. EXPECTED SUBMISSION DATE			
YES (If yes, complete EXPECTED SUBMISSION DATE)					MONTH DAY YEAR			
NO					DATE			
16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)								
<p>In January 2005, SCE recognized that a ground fault on a non-1E 4 kV circuit on the primary side of a non-1E transformer would not trip the 1E breaker to isolate the non-1E circuit from the emergency diesel generator (EDG). This could have resulted in the "A" train EDG tripping after an event that resulted in a ground fault on the non-1E circuit. At that time, SCE focused on the potential for fire to cause a ground on the non-1E circuitry and did not fully consider seismically-induced faults.</p> <p>In July 2006, the NRC questioned if a seismic event could also have caused a fault in the non-1E circuitry. SCE's reevaluation concluded that if a seismic event had occurred followed by a loss of offsite power and a ground fault on the primary side of the non-1E transformer, the "A" train EDG could have been tripped. If this occurred during an EDG "B" train outage, both EDG trains would have been unavailable. At times in the past and as allowed by the Technical Specifications, SCE has removed "B" train EDGs from service. Therefore, SCE is reporting this past condition under 10CFR50.73(a)(2)(b)(A) and (B).</p> <p>A modification installed in 2005 corrected this condition. The safety significance of this occurrence is minimal because the affected circuit is bypassed during SIAS-related events and SONGS is able to crosstie the EDGs between Units 2 and 3 to access the available "B" train EDG.</p>								

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Plant: San Onofre Nuclear Generating Station (SONGS) Unit 2
Discovery Date: July 20, 2006
Reactor Vendor: Combustion Engineering
Mode: Mode 1 – Power Operation
Power: 99 percent

Description of Event:

San Onofre Units 2 and 3 each have two emergency diesel generators (EDGs) [EK] to provide emergency AC power if preferred (offsite) AC power is unavailable. The "A" train EDGs provide standby power directly to safety related (1E) and one non-safety related (non-1E) 4 kV transformer; whereas, the "B" train EDGs supply standby power directly only to 1E-4kV loads. Consistent with NRC Regulatory Guide (RG) 1.75, "Physical Independence of Electric Systems," the "A" train EDGs are protected by a 1E isolation breaker [BKR] and a non-1E transformer [XFMR]. The 1E breaker isolates the non-1E loads from the EDG if there is a phase-to-phase fault in the non-1E circuitry. The non-1E transformer isolates the non-1E loads from the EDG if there is a ground fault on the secondary side of the transformer. See the attached drawing.

In addition, each EDG is protected by a high impedance stator ground detection relay, which will trip the EDG if a ground fault occurs in a connected load. The ground fault protective trip is blocked during postulated accidents that result in a Safety Injection Actuation Signal (SIAS) but not blocked for non-SIAS (e.g. seismic) events.

In January 2005, SCE recognized that a ground fault on the non-1E 4 kV circuit on the primary side of the non-1E transformer would not trip the 1E isolation breaker to isolate the non-1E circuit from the emergency diesel generator (EDG). Therefore, if there was a loss of offsite power with no SIAS and a coincidental or resulting ground in the non-1E circuitry on the primary side of the transformer, the "A" train EDGs could be tripped by the ground detection device before the 1E isolation breaker could isolate the EDG from the faulted non-1E circuit.

Upon discovering this condition in 2005, SCE focused on the potential for fire to cause a ground on the non-1E circuitry on the primary side of the transformer. SCE's evaluation determined that the fire scenario would not prevent the EDG from performing its safety function. Because this condition represented a degradation of measures taken to minimize the potential for and effects of fires, SCE completed a design modification (in April 2005 for Unit 2 and May 2005 for Unit 3), to ensure that the ground protection device would not trip the EDG prior to the 1E isolation breaker operating if there was a fault on the non-1E circuit.

In 2005, SCE determined this condition was not reportable because the EDG was found capable of performing its safety function.

In July 2006, during a NRC Component Design Basis Inspection (CDBI), the NRC questioned if SCE had evaluated whether a seismic event could also cause a fault in the same non-1E circuitry and, if so, if that condition would require a report to the NRC. SCE determined that the 2005 EDG design modifications would prevent the "A" train EDG from tripping on a seismically-induced ground fault on the non-1E circuit. However, the operability evaluation performed in 2005 did not document an analysis of seismic events that could have prevented the "A" train EDG from performing its function prior to installation of the design modifications.

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If a seismic event had occurred followed by a loss of offsite power and a ground fault on the primary side of the non-1E transformer, it is possible the "A" train EDG could have been tripped. If this had occurred during an EDG "B" train outage, both EDG trains would have been unavailable to perform their required safety function. At times in the past, a "B" train EDG has been taken out of service for planned work as allowed by the Technical Specifications. Based on the guidance provided in NRC NUREG-1022, on July 20, 2006 (discovery date), SCE concluded this past condition is reportable in accordance with 10CFR50.73(a)(2)(v)(A) and (B), as an event or condition that could have prevented fulfillment of a safety function required to maintain the reactor in a safe shutdown condition and to remove residual heat.

Cause of Event

In 1983, SCE modified the original design to attach a non-1E circuit to a 1E bus. At that time the 1E isolation breaker was installed consistent with RG 1.75 requirements. However, it was not realized that the ground fault protective trip on the EDG was faster than the 1E isolation breaker. Due to the passage of time, it is not clear why this design did not preclude this condition.

Corrective Actions

In 2005, the EDG stator ground protection scheme was modified to immediately isolate the non-1E circuit when a line-to-ground fault is detected and to add a 5-second delay to the EDG ground fault protective trip. If the fault is cleared within 5 seconds of isolation of the non-1E circuit, the stator ground relay will reset and the EDG will not trip. If the fault has not cleared after 5 seconds, the EDG will trip. This change provides sufficient time for the existing non-1E circuit to separate from the 1E bus without affecting the EDG.

A cause evaluation is in progress to determine why a seismic event evaluation was not formally documented when evaluating the potential causes of a fault in the non-1E circuits. Additional corrective actions may be identified and implemented.

Safety Significance

The safety significance of this past condition is minimal. The Train "B" EDGs were unaffected by this condition. The EDGs are required to function following SIAS and non-SIAS events.

1. Following SIAS events, the EDGs are required to start and load within 10 seconds. A SIAS blocks the protective EDG trip and disconnects non-1E loads from the safety-related buses. Therefore, even before the 2005 design modifications, a fire or seismically induced ground fault on the non-1E circuit would not have prevented the "A" train EDGs from performing their required safety functions. For SIAS events, there is no safety significance to this condition.
2. Following a non-SIAS event, it is possible that if a seismic event had occurred followed by a loss of offsite power and a ground fault on the primary side of the non-1E transformer, the "A" train EDGs could have been tripped. SCE performed a probabilistic risk assessment and demonstrated that the safety significance of this condition is minimal (increase in core damage frequency of 1E-7/year and increase in large early release frequency of less than 1E-8/year) due to the low probability of this scenario, the robustness of the non-1E cable and windings on the primary side of the transformer, and the capability of using the crosstie between Units 2 and 3 to access the available "B" train EDG.

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Additional Information

SCE previously reported instances of inadequate separation of 1E and non-1E circuits in LERs 2000-002 and 1999-005.

"A" EDG Circuitry

