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

August 23, 2005

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

Subject: **Docket No. 50-362**
Licensee Event Report No. 2005-001
San Onofre Nuclear Generating Station, Unit 3

Dear Sir or Madam:

On June 26, 2005, Southern California Edison (SCE) made a phone report to the NRC for a condition affecting the emergency diesel generators (EDGs) at San Onofre Unit 3. SCE subsequently determined that both Unit 3 EDGs remained operable and a report to the NRC was not required.

The original phone report (Event Log No. 41798) was retracted by phone on August 23, 2005. SCE is providing this voluntary LER to document this condition and inform the NRC of the corrective actions taken.

If you require any additional information, please contact me.

Sincerely,

Daniel P. Breig

Unit 3 LER No. 2005-001

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 EXPIRES: 06/30/2007

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.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
San Onofre Nuclear Generating Station (SONGS) Unit 3	05000-362	1 OF 5

4. TITLE

Emergency Diesel Generator (EDG) 3G003 Declared Inoperable Due to Loose Wiring Connection on Emergency Supply Fan

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
06	26	2005	2005-001-00			08	23	2005	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	1
10. POWER LEVEL	100

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)	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)	X 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)	Voluntary
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	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
				N					

14. SUPPLEMENTAL REPORT EXPECTED			15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

On 06/25/2005, at about 1335 PDT, during a routine surveillance test of EDG 3G003, Emergency Supply Fan 3MA276 did not start. SCE operators declared 3G003 inoperable. SCE traced the fan failure to start to a loose electrical connection. SCE also found the same contact for 3G003 fan 3MA277 loose, but the fan still started. These connections were tightened; other connections were confirmed to be acceptable. EDG 3G003 was start tested and declared operable at 0406 PDT on 06/26/2005.

EDG 3G002 was inspected and other connections were found not completely tight. SCE could not conclusively determine if those connections would have caused 3G002 inoperability and conservatively declared 3G002 inoperable at 0459 PDT on 06/26/2005. This event was reported to the NRC on 06/26/2005 (Event Log No. 41798) in accordance with 10CFR50.72(b)(3)(v)(D).

It was subsequently determined that the connections found on 3G002 did not affect its operability and 3G002 remained operable and available to fulfill its design and safety function.

On 08/23/2005, SCE retracted its 06/26/2005 phone report (Event Log No. 41798) and is providing this LER to document this event and inform the NRC of the corrective actions taken.

Plant: San Onofre Nuclear Generating Station (SONGS) Unit 3
Event Date: June 26, 2005
Reactor Vendor: Combustion Engineering
Mode: Mode 1 – Power Operation
Power: 100 percent

Background

San Onofre Unit 3 has two Emergency Diesel Generators (EDGs) [EK] to provide emergency AC power if normal AC power is unavailable. For EDG room cooling, each EDG has two emergency supply fans [FANS]. The fans are designed to keep EDG building air temperature below 122 degrees F when the EDG is running. The emergency supply fans are automatically placed in operation upon receipt of a corresponding EDG start signal.

Technical Specifications (TS) 3.8.1 requires two EDGs to be operable during Modes 1-4. If one EDG is inoperable, TS 3.8.1, Action B requires SCE to restore the EDG to operable status in 14 days and TS 3.8.1, Action B.3.1 requires SCE to investigate and determine if the remaining EDG is inoperable due to common cause issues. With two EDGs inoperable, SCE must restore one EDG to operable status within two hours (TS 3.8.1, Action E).

Description of Event

On June 25, 2005, at about 1335 PDT, during a routine monthly surveillance start test of Unit 3 EDG 3G003, Emergency Supply Fan 3MA276 did not start and plant operators declared 3G003 inoperable. SCE's investigation traced the 3MA276 fan failure to a loose wire connection on the motor-starter [MSTR] thermal overload (TOL) auxiliary contact (the "49" contact) in cubicle 3BH11. The screw securing the two ring-tongue lugs at this contact terminal was found to be loose. SCE personnel checked the wiring and confirmed the neutral circuit path lost continuity, which prevented fan 3MA276 from starting.

SCE inspected the remaining seven (there are eight total) safety-related cubicles for Unit 3 EDG 3G003 that contain motor-starter TOL auxiliary contacts. The wires were gently "wiggled" or moved to determine connection tightness. All connections were acceptable with the exception of the TOL contact for Emergency Supply Fan 3MA277. Fan 3MA277 had started successfully during the surveillance test but its TOL auxiliary contact (in cubicle 3BH12) was found to be loose. After tightening the TOL contacts for fan 3MA276 and 3MA277, plant operators successfully start-tested 3G003 (both fans started) and declared 3G003 operable at 0406 PDT on June 26, 2005.

SCE also inspected the safety related cubicles for EDG 3G002 for loose connections as required by TS 3.8.1, Action B.3.1 (common cause investigation). On June 26, 2005 at 0459 PDT, SCE found two connections for EDG 3G002 that were not completely tight (i.e., loose) and declared 3G002 inoperable. Components affected were a Radiator Fan and an Emergency Supply Fan.

When the loose connections on 3G002 were found, SCE could not conclusively determine if the loose connections would have caused 3G002 inoperability and conservatively declared 3G002 inoperable. Because EDGs 3G002 and 3G003 could have been inoperable at the same time, SCE reported this occurrence to the NRC on June 26, 2005 (Event Log No. 41798) in accordance with 10CFR50.72(b)(3)(v)(D) as an event or condition that could have prevented fulfillment of a safety function. Offsite power sources remained available throughout this event.

As part of the root cause evaluation, SCE determined that the conditions found on EDG 3G002 did not prevent its operability. The wires terminating at those connections could be wiggled but the ring-tongue lugs remained electrically connected and the circuit complete. Bench-testing of the motor-starter confirmed that 3G002's electrical contact was maintained and the EDG remained operable throughout this event (3G002 was declared operable at 1340 PDT on June 26, 2005). Because at least one EDG remained operable, there was not a loss of safety function and this event was determined to be not reportable. On August 23, 2005, SCE retracted the original phone report (Event Log No. 41798) and is providing this LER to document this event and inform the NRC of the corrective actions taken.

To address possible common cause issues on Unit 2, SCE successfully start-tested EDGs 2G002 and 2G003, inspected the wire connections, and confirmed the connections were acceptable.

Cause of the event

EDG fan 3MA276 did not start during the June monthly surveillance test because of a poor electrical connection at the TOL terminal screw. The screw was tightened and the fan started when tested.

SCE's preliminary findings indicate that the neutral connection on the "49" contact in cubicle 3BH11 for fan 3MA276 was loose and also noted a thin non-conductive oxide layer (tarnish) was on the terminal screw at the time of the occurrence. It is most likely that both conditions (loose screw and non-conductive oxide layer) contributed to the loss of circuit continuity. The root cause evaluation is ongoing and when complete, may determine additional factors which lead to the failure of the fan to start.

Corrective Actions

Immediate actions were to inspect the safety-related electrical cubicles for the Unit 2 and 3 EDGs for acceptable wiring connections. Afterward, inspections of other selected motor-starters with TOL contacts, outside of the EDG rooms, were conducted to determine extent of condition.

Completed and planned corrective actions for Unit 2 and 3 EDGs:

1. SCE traced the 3MA276 fan failure to a loose wire connection on the motor-starter TOL contact in cubicle 3BH11. SCE personnel checked the wiring and confirmed the neutral circuit path lost continuity, which prevented fan 3MA276 from starting. After the screw was tightened, fan 3MA276 started when tested.

2. SCE inspected the electrical connections of all 32 safety-related Motor Control Center (MCC) cubicles with motor starters for the 4 EDGs. Except for the two loose connections in cubicles 3BH11 and 3BH12, the other inspected wiring connections were acceptable.

3. On July 8, 2005, motor-starters in cubicles 3BH11 and 3BH12 were removed and replaced with in-kind parts. On July 11, 2005, laboratory analysis on the motor-starters removed from 3BH11 and 3BH12 determined that there was no unusual degradation of the loose terminal connections on the "49" device.

4. On July 12, 2005, SCE bench-tested the motor starters removed from 3BH11 and 3BH12 to duplicate the as-found condition of the loose connection on fan 3MA276. However, a thin non-conductive oxide layer (tarnish) on the screw that was present during the event had been removed as a consequence of tightening the screw on June 26, 2005. Therefore, the as-found condition (i.e., a motor-starter remaining de-energized) could not be duplicated. The testing showed that circuit continuity could be maintained even with the connection screw loose, as seen on fan 3MA277.

5. SCE also inspected an additional 12 EDG cubicles (with and without motor starters) in Unit 2 EDG 2G003. The wiring connections were acceptable.

6. SCE completed a work history review for the 3BH11 and 3BH12 cubicles. This review concluded that the TOL auxiliary contact in 3BH11 and 3BH12 had not been replaced or modified and did not have previous occurrences of unacceptable connections.

7. SCE plans to inspect additional MCC cubicles for EDGs 3G003, 3G002 and 2G002 for loose connections.

SCE has completed or will complete additional inspections beyond the EDG systems to determine the possible extent of this condition (loose terminal connections) as follows:

1. Nine cubicles containing safety-related motor-starters located in the Control Building were inspected. The wiring connections were acceptable.

2. SCE developed a ranking of risk significant components containing motor-starters with TOL auxiliary contacts. Based on this ranking, 18 components (nine on each

Units 2 and 3) will be inspected to ensure wiring connections are acceptable. To date, one "49" contact on an Unit 3 auxiliary feedwater discharge flow control valve was found loose. The valve was stroked and determined operable prior to the wiring inspection.

After completion of the root cause evaluation, SCE will determine if additional corrective actions are required.

Safety Significance

Throughout this event, San Onofre remained connected to the offsite power grid and offsite power was operable. Additionally, 3G002 was determined to be operable and available to fulfill its design and safety function. The safety significance of the loose connection affecting EDG 3G003 is, therefore, minimal.

As noted in the Corrective Action section SCE to date has inspected more than 40 cubicles containing motor-starters with TOL contacts (approximately 2000 connections). Of the population inspected, three connections (the original two on EDG 3G003, and one connection on an auxiliary feedwater discharge flow control valve) were found loose and are "49" contacts. Of these three contacts, one resulted in equipment (fan 3MA276) not functioning. The safety significance of this issue is, therefore, minimal.

Additional Information:

SCE also performed an engineering analysis to determine the affect on EDG 3G003 with fan 3MA276 not functioning. The analysis demonstrated that with an outside ambient air temperature of 80 degrees F or less (as was the condition during this event), fan 3MA277 is capable of providing enough cooling to the EDG room with 3G003 running. Consistent with the guidance provided by Generic Letter 91-18, Revision 1, therefore, 3G003 was operable and capable of fulfilling its safety function.

In the past three years, SCE has not reported any other instances of a loss of safety function as a result of a loose connection or reportable instances of EDG inoperability.