

April 24, 2002

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Subject: **Docket No. 50-362**
60-Day Report
Licensee Event Report No. 2002-001
San Onofre Nuclear Generating Station, Unit 3

Gentlemen:

This submittal provides Licensee Event Report (LER) 2002-001 describing the loss of offsite power event that occurred at Unit 3 on February 27, 2002. Four consequential events (reactor trip, starting both emergency diesel generators, initiation of the Auxiliary Feedwater System, and initiation of the Emergency Containment Cooling System) are reportable in accordance with 10CFR50.73(a)(2)(iv)(A). These events did not affect the health and safety of either plant personnel or the public.

Any actions listed are intended to ensure continued compliance with existing commitments as discussed in applicable licensing documents; this LER contains no new commitments. If you require any additional information, please advise.

Sincerely,



Enclosure:

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

IE22

NRC FORM 366 (MM-YYYY)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104		EXPIRES MM-YYYY		
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)				Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Information and Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If a document 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.				
FACILITY NAME (1) San Onofre Nuclear Generation Station (SONGS) Unit 3				DOCKET NUMBER (2) 05000-362		PAGE (3) 1 of 6		
TITLE (4) Loss of Offsite Power With Consequential RPS/ESF Actuations Due To Maintenance Error								
EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR
2	27	2002	2002	001	00	4	24	2002
			OTHER FACILITIES INVOLVED (8)					
			FACILITY NAME			DOCKET NUMBER		
			FACILITY NAME			DOCKET NUMBER		
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)						
1		20.2201(b)		20.2203(a)(3)(i)		50.73(a)(2)(i)(C)		50.73(a)(2)(vii)
		20.2201(d)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(A)
POWER LEVEL (10)		20.2203(a)(1)		20.2203(a)(4)		50.73(a)(2)(ii)(B)		50.73(a)(2)(viii)(B)
100		20.2203(a)(2)(i)		50.36(c)(1)(i)(A)		50.73(a)(2)(iii)		50.73(a)(2)(ix)(A)
		20.2203(a)(2)(ii)		50.36(c)(1)(ii)(A)		<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)		50.73(a)(2)(x)
		20.2203(a)(2)(iii)		50.36(c)(2)		50.73(a)(2)(v)(A)		73.71(a)(4)
		20.2203(a)(2)(iv)		50.46(a)(3)(ii)		50.73(a)(2)(v)(B)		73.71(a)(5)
		20.2203(a)(2)(v)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(C)		OTHER
		20.2203(a)(2)(vi)		50.73(a)(2)(i)(B)		50.73(a)(2)(v)(D)		Specify in Abstract below or in NRC Form 366A
LICENSEE CONTACT FOR THIS LER (12)								
NAME R. W. Krieger, Vice President, Nuclear Generation						TELEPHONE NUMBER (Include Area Code) 949-368-6255		
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)								
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT
SUPPLEMENTAL REPORT EXPECTED (14)						EXPECTED SUBMISSION DATE (15)		
YES (If yes, complete EXPECTED SUBMISSION DATE).				<input checked="" type="checkbox"/> NO		MONTH DAY YEAR		

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

On 2/27/02 at 1043 PST, a technician was performing maintenance and testing in the San Diego Gas & Electric (SDG&E) portion of the San Onofre switchyard. As planned for the work, the South West bus was de-energized. All the transmission lines from SDG&E territory, Unit 3 reserve auxiliary transformer (RAT), and Unit 3 main transformer (main generator) were aligned to "South East" bus. The technician's approved work scope was to test the Breaker Failure Local Backup (BFLBU) scheme on the South West bus breakers. The technician exceeded the authorized work scope and chose also to test the cross bus BFLBU trip from a breaker on the South East bus. While doing so, the technician also failed to isolate a trip signal between the South West bus and the South East bus and the resulting signal tripped all the breakers connected to the South East bus, including the Unit 3 main transformer breaker and Unit 3 RAT breakers. Consequently, the Unit 3 main turbine/generator tripped, the reactor tripped, both emergency diesel generators started and Auxiliary Feedwater started. Operators manually started the Emergency Containment Coolers.

The loss of offsite power and associated Reactor Protection System and Engineered Safety Features actuations were reported to the NRC in accordance with 10CFR50.72(b)(2)(iv)(B) and 10CFR50.72(b)(3)(iv)(A). This written report is provided in accordance with 10CFR50.73(a)(2)(iv)(A).

Offsite power was restored in about 32 minutes. Future switchyard detailed work plans will be reviewed and approved by SONGS Operations prior to the commencement of work.

The event had minimal safety significance.

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Plant: San Onofre Nuclear Generation Station (SONGS) Unit 3
 Event Date: February 27, 2002

	<u>Unit 2</u>	<u>Unit 3</u>
Reactor Vendor:	Combustion Engineering	Combustion Engineering
Mode:	Mode 1 – Power Operation	Mode 1 – Power Operation
Power:	100 percent	100 percent

BACKGROUND:

Features of the San Onofre (SONGS) Units 2 and 3 electrical distribution system include the following (See Figure 1):

- The 230 kV switchyard [FK] is a double bus, double circuit breaker arrangement with nineteen positions.
- The Unit 3 main transformer [EL] steps up 22 kV generated by the Unit 3 main generator [TB] to 230 kV for transmission to the grid.
- Non-Class 1E 6.9 kV buses provide power to the four Unit 3 Reactor Coolant [AB] Pumps (RCP) [P]. During normal operation, the Unit 3 main generator powers these buses through the Unit 3 Unit Auxiliary Transformer (UAT). While shutdown, during startup, or when the Unit 3 UAT is not available, these buses are powered from the switchyard through Unit 3 Reserve Auxiliary Transformer (RAT). The buses can also be powered from the Unit 2 RAT, provided it is not being used to provide power to the Unit 2 RCPs.

Power to these buses can be manually or automatically transferred from one source to another without de-energizing the buses to ensure continuous operation of the RCPs.

- The RATs step down switchyard voltage to supply 4.16 kV Class 1E buses. These buses provide power to the Engineered Safety Featured (ESF) loads under normal and accident conditions, using the most preferred source of power available. The preferred sources, in order of preference, are the Unit 3 RATs, the corresponding Unit 2 Class 1E buses, and the Unit 3 emergency diesel generators (EDGs) [EK]. The buses also provide power to selected non-ESF loads under normal and abnormal operating conditions.
- The Unit 3 RATs also supply 4.16 kV non-Class 1E buses. However, there are no provisions to power buses 3A03, 3A07, 3A08, or 3A09 from Unit 2 or an EDG.
- As indicated on the attached figure, the northern section of the SONGS switchyard is controlled by Southern California Edison (SCE); the southern portion is controlled by San Diego Gas and Electric (SDG&E).

DESCRIPTION OF THE EVENT:

On February 27, 2002 (event date) at 1043 PST, a SDG&E technician (non-utility, non-licensed) was performing maintenance and testing in the SDG&E portion of the SONGS switchyard. As planned for

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the work, the "South West" bus was de-energized. All the transmission lines from SDG&E territory, Unit 3 RATs, and Unit 3 main transformer (main generator) were aligned to "South East" bus. The SDG&E technician's approved work scope was to test the Breaker Failure Local Backup (BFLBU) scheme on the South West bus breakers (i.e. breaker 6122). The technician completed the testing on the circuit for breaker 6122, then chose to test the cross bus BFLBU trip from breaker 4122, located on the South East bus. While doing so, the technician incorrectly generated a signal for breaker 6122 from breaker 4122, actuating the South East bus breaker failure scheme. This signal tripped all the breakers connected to the South East bus, including the Unit 3 main transformer breaker and Unit 3 RAT breakers (AR020201440). The following consequential events occurred at Unit 3 (unless otherwise stated):

- The main turbine/generator tripped.
- The reactor tripped. All control rods fully inserted. See Additional Information.
- Both emergency diesel generators (EDGs) started on loss of voltage (LOVS) on the 1E buses. As designed, the 1E buses automatically transferred to their Unit 2 1E sources, so the EDGs' output breakers did not close.
- Due to the loss of non-1E power:
 1. The main condenser circulating water pumps lost power, resulting in a loss of condenser vacuum.
 2. The condensate booster pumps lost power, resulting in the main feedwater pumps tripping (low suction pressure) and the loss of main feedwater flow. Auxiliary Feedwater (AFW) automatically started on steam generator low level and automatically controlled steam generator water level. Unit 3 was then in Mode 3 with decay heat being removed by AFW and steaming to the atmosphere through the Atmospheric Steam Dump Valves (ADV).
 3. The containment normal coolers lost power. Operators subsequently manually started the Emergency Containment Coolers (ECC).
- All Unit 3 auxiliary loads transferred to the Unit 2 RAT, as designed. All four reactor coolant pumps continued to run.

These major plant responses were normal and expected.

The loss of offsite power (LOP) and associated reactor protection system (RPS) and ESF actuations were reported to the NRC (Log No. 3873) in accordance with 10CFR50.72(b)(2)(iv)(B) and 10CFR50.72(b)(3)(iv)(A). This written report is provided in accordance with 10CFR50.73(a)(2)(iv)(A).

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CAUSE OF THE EVENT:

This event was caused by cognizant personnel error. The technician performing switchyard testing exceeded his authorized work scope (the authorized clearance boundary) and decided to conduct breaker trip testing of the cleared breakers. Because the technician also failed to isolate one of the breaker trip signals, when breaker 4122 was trip tested, the South East bus BFLBU caused the South East bus section to isolate. This action then isolated Unit 3 from the grid causing it to trip.

This event could have been prevented if SCE had more effectively controlled work activities in the switchyard. SCE did not conduct a review of the planned work nor conduct a tailboard, relying instead on standard SCE and SDG&E switchyard practices.

CORRECTIVE ACTIONS:

- Offsite power was restored to Unit 3 at approximately 1115 PST the same day;
- Future switchyard detailed work plans will be reviewed and approved by SONGS Operations prior to the commencement of work; and
- This event and its corrective actions will be reviewed with appropriate SONGS, SCE Grid Operation and Maintenance, and SDG&E personnel who work in the SONGS Switchyard.

SAFETY SIGNIFICANCE:

An assessment of the conditional core damage and large early release probabilities, and increase in core damage and large early release frequencies determined the Unit 3 conditional core damage probability (CCDP) and large early release probability (CLERP) were approximately $2.1E-5$ and $8.5E-7$, respectively. This assessment was based on the reported actual component unavailability and system alignments at the time of the event. All safety-related equipment designed to mitigate the event operated as designed during the event.

This event was not caused by nor did it result in any Safety System Functional Failure (SSFF). This event did not impact the ability to shut down the Unit or mitigate the consequences of an accident. This occurrence is categorized "Green" using the latest draft of the Reactor Safety Significance Determination Process (SDP).

ADDITIONAL INFORMATION:

1. At the time of the event, the non-1E instrument bus which supplies power to the reactor core mimic board was being powered from its alternate (off-site) AC power source. Thus, when offsite power was lost, the reactor core mimic (which provides information on CEA position) was deenergized. Alternate indications of a reactor trip were available (reactor trip breakers open and CEA status on Core Protection Calculators). However, operators initiated emergency boration of the RCS as directed by procedure due to the normal status indication being lost. Boration was suspended when the instrument bus was transferred back to its uninterruptible power supply (UPS) a few minutes later.
2. In the past three years, SCE has reported:

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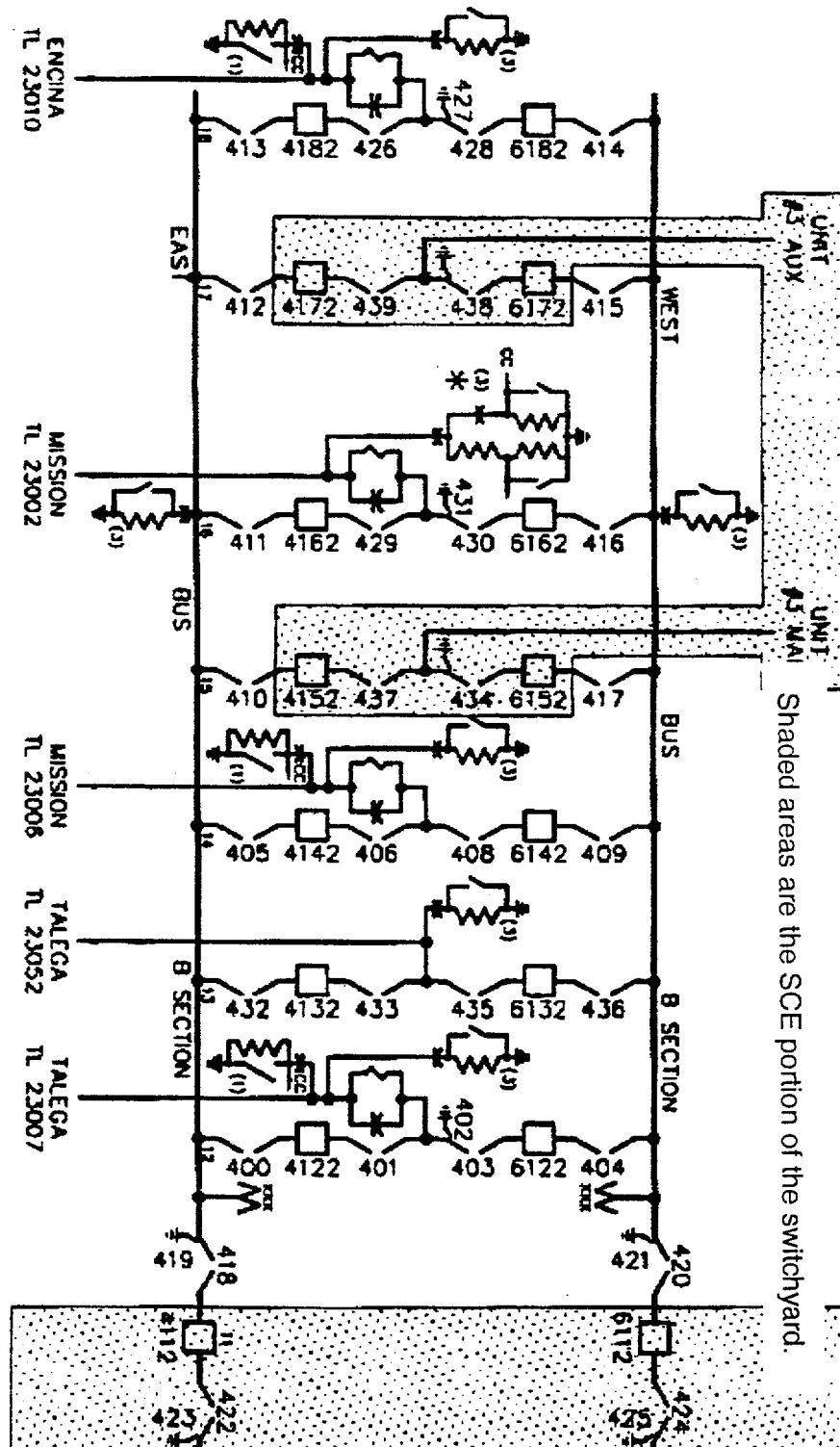
- The loss of offsite power (reactor trip, EDG start, AFW start, and ECC start) for Unit 3 (LER 3-2001-001) caused by a breaker failure and fire in the plant (not switchyard), a cause not present in this case. Therefore, corrective actions for that event would not have prevented the event reported herein.
- The automatic start of the Unit 2 EDGs (LER 2-1999-001). That event was caused by personnel error when a breaker was closed on a grounded emergency bus. The corrective actions for that event would not have been expected to prevent the event reported herein.
- A Unit 3 manual reactor trip and AFW initiation in response to the loss of normal feedwater flow (LER 3-1999-003). The event occurred when the main feedwater regulating valves failed closed. The corrective actions for that event would not have been expected to prevent the event reported herein.
- A Unit 3 manual reactor trip and AFW initiation in response to a rapid increase in normal feedwater flow (LER 3-1999-004). The event occurred when a main feedwater regulating valve failed open at 24 percent power. The corrective actions for that event would not have been expected to prevent the event reported herein.

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Figure 1 – SONGS Switchyard



Shaded areas are the SCE portion of the switchyard.