NRC Form 366
(9-83)*

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
South Texas, Unit 1	0 5 0 0 0 4 9 8	1 OF 0 4

TITLE (4)

Actuation of ESF Load Sequencer and Standby Diesel Generator Due to Personnel Error

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
										0 5 0 0 0
1 1	3 0	8 7	8 7	— 0 2 1	— 0 0	0 1	0 8	8 8		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
4		20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
0 0 0		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Charles Ayala - Supervising Licensing Engineer	5 1 2 9 7 2 - 8 6 2 8

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
X											

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

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

At approximately 2145 hours on November 30, 1987 with the Unit in Mode 4 prior to initial criticality, while troubleshooting the Train B Engineered Safety Feature (ESF) load sequencer, an unanticipated bus strip and diesel generator start occurred when a maintenance technician deenergized the sequencer. The sequencer was reenergized to clear the bus strip and the sequencer correctly began a Loss of Offsite Power (LOOP) loading sequence. After confirming that no LOOP actually existed, the sequencer was deenergized, the diesel generator was stopped, and affected equipment was returned to normal alignment. The cause of the occurrence has not been conclusively identified. The most likely cause appears to be the creation of unusual logic states in the sequencer main processor when it was partially deenergized. The method for deenergization of the sequencers has been revised to preclude the possibility of this type of failure.

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NL.LER87021

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

DESCRIPTION OF OCCURRENCE:

At approximately 2145 hours on November 30, 1987 with the Unit in Mode 4 prior to initial criticality, while troubleshooting of the Train B Engineered Safety Feature (ESF) load sequencer, an unanticipated Train B bus strip (removal of all loads on the 4.16 kVolt ESF bus) and a Train B standby diesel generator start occurred when a technician partially deenergized the Train B ESF sequencer. An investigation was initiated to determine the sequence of events which caused the unanticipated bus strip and the start of the Train B ESF diesel generator.

There are three (3) safety-related independent electrical trains in Unit 1. Each ESF sequencer is designed to shed loads from the 4.16 kVolt ESF bus, start the corresponding ESF diesel generator and energize, in programmed steps, the equipment necessary for an emergency event.

The investigation concluded that at approximately 1830 hours on November 30, 1987 the Unit Supervisor noted an abnormal indication (auto-test failure) on the Train B and C ESF sequencers. The ESF sequencer auto-test function performs on-line diagnostic tests of the sequencer circuits. If an auto-test failure indication can be cleared by depressing the reset button then there is no impact on the operability of the sequencer. The Train C ESF sequencer auto-test failure indication was reset by depressing the corresponding reset button, but the Train B ESF sequencer auto-test failure indication would not reset when the Unit Supervisor depressed the Train B reset button.

The Instrumentation and Controls (I&C) technicians (HL&P maintenance personnel) were troubleshooting the source of the auto-test failure indication. At approximately 2115 hours, in an attempt to clear the auto-test failure indication, the technicians partially deenergized and then reenergized the Train B ESF sequencer using two (2) secondary power breakers simultaneously; however, this did not clear the auto-test failure indication. At approximately 2145 hours a technician again partially deenergized the Train B ESF sequencer using the same two (2) secondary power breakers to replace a suspected faulty optical isolation module. However, this time a Train B ESF bus strip occurred and the Train B ESF diesel generator started. After replacement of the isolation module (about 5 minutes later), the technician reenergized the Train B FSF sequencer to return it to service. Upon energization, the sequencer correctly began a Loss of Offsite Power (LOOP) loading sequence due to the undervoltage condition that occurred when the bus was stripped. Since the Train A and C sequencers were not affected by the occurrence it was established that no actual LOOP condition existed and the Train B ESF sequencer was deenergized, the Train B diesel generator was secured, and the ESF equipment actuated by the sequencer was returned to normal alignment.

NL.LER8702

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Troubleshooting of the auto-test failure indication was being performed with the guidance of the manufacturer's Technical Manual. The Technical Manual requires technicians to deenergize the DC power supplies but does not indicate which breakers should be opened. Previous experience with deenergizing the ESF sequencers using the two (2) secondary breakers had not produced any ESF actuations.

The NRC was notified of the auto-actuation of the Train B standby diesel generator and the LOOP sequence pursuant to 10CFR50.72(b)(2)(ii) at 0121 hours on December 1, 1987.

CAUSE OF OCCURRENCE:

The cause of the bus strip and start of Train B diesel generator could not be conclusively determined. The most likely cause is that when the Train B ESF sequencer was partially deenergized, unusual logic states in the main processor may have been caused which actuated one or more of the sequencer output relays which were not deenergized by the secondary breakers.

The archetict engineer's (Bechtel's) design engineer for the ESF sequencers subsequently stated that the main breaker should be opened when deenergizing the sequencer in order to remove power from all sequencer circuits at the same time. The single main circuit breaker deenergizes the two (2) secondary breakers as well as removing 125 VDC from the output relays. With the 125 VDC removed from the output relays, actuation is not possible.

ANALYSIS OF EVENT:

There were no adverse safety consequences as a result of the event since the plant had not been critical and no radioactivity had been produced. The event did not result in risk to the public. A loss of offsite power did not actually occur.

This event, an ESF actuation, was reportable to the NRC pursuant to 10CFR50.73(a)(2)(iv).

CORRECTIVE ACTION:

To prevent recurrence of this type event the following actions have been or will be taken:

1. The Instrumentation and Control technicians have received training on deenergizing one ESF sequencer by opening the main circuit breaker.

2. The vendor manuals will be revised to clarify the proper method of deenergizing the ESF sequencer by February 10, 1988.

NL.LER87021

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

CORRECTIVE ACTION: (Cont.)

3. Caution signs have been placed on the sequencers to warn technicians and operators to use the single main circuit (lower) breaker for deenergizing the sequencer.

ADDITIONAL INFORMATION:

One other reportable event similar to this event has occurred at South Texas Project Electric Generating Station and is documented in LER 87-025.

The sequencers are manufactured by Sorrento Electronics (G. A. Technologies). HL&P has not identified any failures of this type in similar sequencers at other plants.

The Light company
Houston Lighting & Power

P.O. Box 1700 Houston, Texas 77001 (713) 228-9211

January 8, 1988
ST-HL-AE-2463
File No.: G26
10CFR50.73

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

South Texas Project Electric Generating Station
Unit 1
Docket No. STN 50-498
Licensee Event Report 87-021 Regarding
Actuation of ESF Load
Sequencer and Standby Diesel Generator

On December 1, 1987 Houston Lighting & Power (HL&P) notified the NRC pursuant to 10CFR50.72 and 10CFR50.73 of a reportable event regarding the actuation of an ESF load sequencer and a standby diesel generator. This event did not have any adverse impact on the health and safety of the public. In accordance with 10CFR50.73 HL&P submits the attached Licensee Event Report (LER 87-021).

If you should have any questions on this matter, please contact Mr. C.A. Ayala at (512) 972-8628.

G. E. Vaughn
Vice President
Nuclear Plant Operations

GEV/KMS/clr

Attachment: Licensee Event Report Regarding
Actuation of FSF Load Sequencer
and Standby Diesel Generator

NL.LER87021

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cc:

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