

The Light company

Houston Lighting & Power

South Texas Project Electric Generating Station P. O. Box 289 Wadsworth, Texas 77483

May 22, 1991

ST-HL-AE-3781

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 91-015
Regarding an Engineered Safety Feature
Actuation Caused by a Failed Light Emitting Diode

Pursuant to 10CFR50.73, Houston Lighting & Power Company (HL&P) submits the attached Licensee Event Report (LER 90-015) regarding a Engineered Safety Feature actuation caused by a failed light emitting diode.

If you should have any questions on this matter, please contact Mr. C. A. Ayala at (512) 972-8628 or myself at (512) 972-7205.

William J. Jump

William J. Jump
Manager,
Nuclear Licensing

SMH/kmd

Attachment: LER 91-015 (South Texas, Unit 1)

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A Subsidiary of Houston Industries Incorporated

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Houston Lighting & Power Company
South Texas Project Electric Generating Station

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Revised 01/29/91

L4/NRC/

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) South Texas, Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 4 9 8				PAGE (3) 1 OF 0 4	
TITLE (4) Engineered Safety Feature Actuation Caused by a Failed Light Emitting Diode															
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 4	2 2	9 1	9 1	0 1 5	0 0	0 5	2 2	9 1				0 5 0 0 0			
OPERATING MODE (9) 1										THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following: (11))					
POWER LEVEL (10) 1 0 0		20.402(b)			20.405(c)			<input checked="" type="checkbox"/> 50.73(a)(2)(iv)			73.71(b)				
		20.405(a)(1)(i)			50.36(c)(1)			50.73(a)(2)(v)			73.71(c)				
		20.405(a)(1)(ii)			50.36(c)(2)			50.73(a)(2)(vi)			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)(vii)(A)							
		20.405(a)(1)(iv)			50.73(a)(2)(ii)			50.73(a)(2)(vii)(B)							
		20.405(a)(1)(v)			50.73(a)(2)(iii)			50.73(a)(2)(ix)							
LICENSEE CONTACT FOR THIS LER (12)										TELEPHONE NUMBER					
NAME Charles Ayala - Supervising Licensing Engineer										AREA CODE 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 NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC					
X	J G I L	G 0 7 4		Yes											
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR	
YES (If yes, complete EXPECTED SUBMISSION DATE)										<input checked="" type="checkbox"/> NO					

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

On April 22, 1991, Unit 1 was in Mode 1 operating at 100% power. At 0200, during performance of a Train C Engineered Safety Feature Sequencer surveillance test, the Train C Auxiliary Feedwater (AFW) Pump inadvertently started. The pump was secured at 0208. The cause of this event was failure of a Light Emitting Diode (LED) in the Sequencer test circuitry. The LED has been replaced. An evaluation has determined that a similar failure of an LED in the Sequencer actuation circuitry, rather than the test circuitry, would prevent actuation of the associated ESF component. The functionality of the sequencer is tested quarterly. In addition, if such a failure occurred, an alarm would indicate the affected component had failed to start and operator action could be taken to start the component. Therefore, since there has been only one such failure at STP, no additional corrective action is planned.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
South Texas, Unit 1	0500049891	—	015	—	00	02	OF 04

TEXT (If more space is required, use additional NRC Form 365A's) (17)

DESCRIPTION OF EVENT:

On April 22, 1991, Unit 1 was in Mode 1 at 100 percent power. A surveillance test of the C train Engineered Safety Feature (ESF) Sequencer was being performed to check actuation relay function and circuit continuity. During performance of the test, C train Auxiliary Feedwater (AFW) Pump 13 inadvertently started at 0200. The AFW pump was secured at 0208. The incident was reported to the NRC at 0500.

The ESF sequencer surveillance test is performed in the Manual Local mode. In this mode, blocking relays are energized to prevent actuation of some of the sequenced loads. Output relay actuation is indicated on the Output Status Indicator display while circuit continuity is indicated on the External Circuit Continuity Monitor. Initially, all lights on both monitors are out. As the output relays close for each load as it is sequenced, the corresponding lamp on the Output Status Indicator illuminates and remains on for the remainder of the test. When this indication is received, a pushbutton on the External Circuit Continuity Monitor corresponding to the sequenced load is momentarily depressed allowing a current too low to operate the load to flow through the circuit. A light on this monitor illuminates to indicate circuit continuity and extinguishes when the pushbutton is released.

During performance of the test, the lamp associated with AFW pump 13 on the External Circuit Continuity Monitor functioned properly while testing the continuity of the circuit. After all the output relays had sequenced but prior to resetting the sequencer at the end of the test, the lamp associated with the AFW pump lit and remained lit on the External Circuit Continuity Monitor. Actuation of the AFW pump followed. The light on the External Circuit Continuity Monitor for the AFW pump is illuminated by completing the circuit with the monitor pushbutton or by closure of the blocking relay contacts.

Troubleshooting identified that a Light Emitting Diode (LED) in series with an optical isolator had failed open during the surveillance test. The optical isolator provides a current path for the blocking relay associated with the AFW circuit. Failure of the LED caused deenergization of the blocking relay for AFW pump 13, causing the AFW pump to start. The optical isolator was removed and installed on a new board containing a new LED. Functional testing of the blocking circuit was satisfactory.

Indication that blocking relays are energized is provided on the Sequencer Test/Status Control Panel. The blocking relay status contacts are connected in series to illuminate the indication. The indication will not illuminate if any one blocking relay fails to energize. Surveillance procedures require that test personnel verify that the lamp indicating that the blocking relays

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

FACILITY NAME (1) South Texas, Unit 1	DOCKET NUMBER (2) 0500049891	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

DESCRIPTION OF EVENT: (cont'd)

are energized is illuminated. This is done after the sequencer is put into the Manual Local mode and before proceeding with the sequencing portion of the test. During the performance of this test, the blocking relays were successfully energized since the sequencing portion of the test had been completed without AFW actuation. This confirms that the LED failure and subsequent blocking relay deenergization occurred during the performance of the test.

LEDs are also used in the input and output relays that are part of the actuation circuitry. Input and portions of the output relay circuits are continually tested while the sequencer is in the Auto Test mode. Detection of an open input or output circuit interrupts the Auto Test and generates a Trouble indication. Plant operations personnel perform a surveillance once per shift in Modes 1 through 4 to verify that the sequencer is functioning properly in the Auto Test Mode. A portion of the output circuit, including the LED, is not tested in the Auto Test Mode. This portion of the output circuit is functionally tested during the quarterly surveillance performed at the time of this incident. Failure of an LED in the output circuit to the open position would prevent actuation of the associated component. Failure to actuate would be annunciated in the control room and the equipment can be manually started. Open circuit failure of an LED is an unusual condition. More commonly, an LED will short, which affects indication but not circuit operability.

CAUSE OF EVENT:

The cause of this event was a failed open LED in the circuit associated with the blocking relay for the AFW pump. Failure of the LED created an open circuit which allowed the blocking relay to deenergize resulting in the start of the AFW pump.

ANALYSIS OF EVENT:

Unanticipated actuation of the AFW pump occurred during an ESF sequencer surveillance test. Unplanned actuation of an Engineered Safety Feature is reportable in accordance with 10CFR50.73(a)(2)(iv). The LED that failed was part of a test circuit. Failure of this component would not have prevented proper operation of the ESF Sequencer under an actual emergency situation. LEDs are used in the same configuration in other circuits such as those associated with the input and output relays. Failure of an LED or any other component in these circuits to the open position would prevent receipt of a field input signal or prevent closure of output relay contacts to the

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) South Texas, Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 4 9 8 9 1	LEE NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		— 0 1 5	— 0 0		0 4	OF	0 4

TEXT (If more space is required, use additional NRC Form 365A's) (17)

ANALYSIS OF EVENT: (cont'd)

associated component. This component would not be actuated as required by the sequencer. This event did not result in any increased risk to the public or to safe operation of the plant.

CORRECTIVE ACTIONS:

The faulty LED was replaced and the blocking circuit satisfactorily tested.

As noted above, LEDs are included in the actuation circuitry of the sequencer. Failure of any of these LEDs would prevent actuation of the associated ESF component. However, since the component can be manually started upon annunciation in the control room of the failure to actuate condition, coupled with the fact that this is the only such failure to have occurred in either unit's respective sequencers (6 total), no additional corrective actions are considered necessary.

ADDITIONAL INFORMATION:

A review of work history associated with the Unit 1 and Unit 2 ESF sequencer did not reveal a similar failure. A similar LED had previously failed in a shorted condition which prevented illumination of the LED but did not open the circuit.

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