

# The Light company

Houston Lighting & Power South Texas Project Electric Generating Station P. O. Box 289 Wadsworth, Texas 77483

March 16, 1994  
ST-HL-AE-4722  
File No.: G26  
10CFR50.73

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

South Texas Project  
Unit 1  
Docket No. STN 50-498  
Licensee Event Report 94-006  
Manual Reactor Trip Following Unanticipated Test Results

Pursuant to 10CFR50.73, Houston Lighting & Power (HL&P) submits the attached Unit 1 Licensee Event Report 94-006 regarding a manual reactor trip following an unanticipated test result. This event did not have an adverse effect on the health and safety of the public but clearly does not meet the standards for expected operational performance.

If you should have any questions on this matter, please contact Mr. J. M. Pinzon at (512) 972-8027 or me at (512) 972-8664.

*J. F. Groth for*  
J. F. Groth *J. F. Groth*  
Vice President,  
Nuclear Generation

/gm

Attachment: LER 94-006 (South Texas, Unit 1)

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PDR ADOCK 05000498  
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LER94/94074R0.01

Project Manager on Behalf of the Participants in the South Texas Project

03/15/94 (R:19am)

*JEZ*

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LICENSEE EVENT REPORT (LER)

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), 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.

FACILITY NAME (1) South Texas Unit 1	DOCKET NUMBER (2) 05000 498	PAGE (3) 1 OF 4
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TITLE (4) Manual Reactor Trip Following Unanticipated Test Results.

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 NAME	DOCKET NUMBER
02	14	94	94	-- 006 --	00	03	16	94	FACILITY NAME	DOCKET NUMBER 05000
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9) 3	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
POWER LEVEL (10)	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)(vii)	OTHER					
	20.405(a)(1)(iii)	50.73(a)(2)(f)		50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)					
	20.405(a)(1)(iv)	50.73(a)(2)(ff)		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 Jairo Pinzon - Senior Engineer	TELEPHONE NUMBER (Include Area Code) (512) 972-8027
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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

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 February 14, 1994 at 0130 hours, Unit 1 was in Mode 3 at 0% power. Westinghouse Solid State Rod Control System post-modification testing was underway following the installation of a Westinghouse proposed modification to prevent uncontrolled asymmetric rod withdrawal. The reactor was manually tripped in accordance with the test procedure when unanticipated inward rod motion was observed. The cause of this event was a modification which failed post-modification testing. The test was terminated and the Solid State Rod Control System was returned to its original design configuration.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)		PAGE (3)	
South Texas, Unit 1	05000 498	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 4
		94	-- 006 --	00	

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

DESCRIPTION OF EVENT

On February 14, 1994 at 0130 hours, Unit 1 was in Mode 3 at 0% power and boron concentration was approximately 2880 parts per million (ppm). Rod control system post-modification testing was underway following the installation of a modification proposed by the Westinghouse Owner's Group to prevent uncontrolled asymmetric rod withdrawal with a corrupted current order fault present. With outward rod motion demanded and no rod motion expected, inward motion of Control Bank A rods was observed. The reactor was manually tripped in accordance with the approved test procedure. This event is reportable in accordance with 10CFR50.73(a)(2)(iv).

A design change which repositioned diodes on the Westinghouse Solid State Rod Control System logic cabinet slave cyclor decoder cards was made to implement current order timing changes in response to the May 27, 1993, event at Salem described in Generic Letter 93-04, "Rod Control System Failure and Withdrawal of Rod Control Cluster Assemblies". Testing of this design change involved attempted outward rod motion with a Salem-type fault (corrupted current order) installed. This fault consisted of a ground on the DNSPX (inward motion) signal such that when outmotion was demanded, both the UPSPX (outward motion) and the DNSPX signals were simultaneously present, thus creating a corrupted current order similar to that which occurred at Salem.

On February 14, at 0100 hours, the reactor trip breakers were closed and outward rod motion was attempted with all rods on the bottom and with the above described fault installed. After 20 steps of requested out motion, no rod motion was observed. This was the expected result. At 0130 hours, the fault was removed and Control Bank A was withdrawn 10 steps as indicated by the demand step counters with all other rods on the bottom. The fault was reinstalled and the operator attempted to withdraw rods once again. Although no rod motion was expected, four of the eight Control Bank A rods were observed to be moving inward as indicated by Digital Rod Position Indication. Neither motion, nor absence of motion for the remaining four Control Bank A rods could be verified. Rod motion was halted, reactor trip breakers were opened and all rods were verified to be fully inserted as required by the test procedure. The test was terminated and the NRC was notified via the Emergency Notification System.

LICENSEE EVENT REPORT (LER)  
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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

CAUSE OF EVENT

During the Salem event, the control rods responded inconsistently to corrupted current orders such that one rod moved out when inward motion was requested. Following this event, the Westinghouse Owners Group conducted testing, performed equipment surveys, analyzed worst-case asymmetric Rod Control Cluster Assembly withdrawal combinations with three-dimensional analytical methods and performed a Failure Assessment for failures in the Solid State Rod Control System that could lead to corrupted current orders being sent to Control Rod Drive Mechanisms. Based upon these activities, a modification which involved repositioning diodes in the Solid State Rod Control System logic cabinet slave cyclor decoder cards was proposed by Westinghouse to implement the current order timing changes which would ensure that no uncontrolled single or multiple rod withdrawal event could occur with a Salem-type fault on the Solid State Rod Control System. Unit 1 became the lead plant for installation of this modification, and was the only plant upon which this modification was attempted.

The cause of this event (manual trip) was a modification which failed the post-modification test requirement that no rod motion occur when outward rod motion was attempted with the fault installed. The modification as designed, prevented outward rod motion but did not prevent inward rod motion from occurring when outward rod motion was demanded. When inward rod motion did occur, the operator responded correctly in accordance with the approved test procedure and manually tripped the plant.

ANALYSIS OF EVENT

The Solid State Rod Control System performs its intended function, a reactor trip, by putting the reactor in a subcritical condition when a safety system setting is approached, with any assumed credible failure of a single active component. With the standard timing cards reinstalled in Unit 1, the Salem-type failure and event remain a possibility. A review was performed by Westinghouse to assess the impact of operating with the current single failure potential in the Rod Control System. The Westinghouse Rod Control System Evaluation Program (WCAP-13864) determined that of all single Rod Control System failures identified, only the failures which occurred at the Salem plant can result in uncontrolled asymmetric rod motion following a demand for the rods to move. All other identified failures result in rod movement in the demanded direction and are hence limited to a finite number of steps. These failures may result in some asymmetric rod movement following a rod motion demand signal; however, the movement is "limited" by the rod demand signal. These events have been evaluated and have been determined to result in less severe consequences than the limiting single Rod Control System malfunction presented in the accident analysis in the Updated Final Safety Analysis Report. Therefore, all of the single Rod Control System failures, other than those identified to have occurred at Salem, are bounded by the current licensing basis safety analysis.



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

ANALYSIS OF EVENT (cont'd)

As a result of the Salem event however, the assumption that no single failure will result in a single rod withdrawal is no longer valid. To address this issue, Westinghouse has performed an analysis using state-of-the-art methods and computer codes (LOFT5 and SPNOVA). The analysis utilized South Texas Project specific values and considered the effects of a 14 foot core. The results of the analysis are documented in WCAP-13803, Revision 1 and show that South Texas Project Units 1 and 2 will not experience Departure from Nucleate Boiling for a single rod withdrawal event like the Salem event with the current fuel design. Therefore, General Design Criteria 25 is satisfied and no significant safety hazard exists.

No other Westinghouse plants have attempted this modification; therefore, there are no current generic implications resulting from this event. A 10CFR21 notification has already been filed by Westinghouse concerning the Salem event. The inward rod motion observed during this event was conservative from a safety analysis perspective as was the post-modification test procedure requirement to initiate a manual trip if any rod motion was observed. Thus, there was no threat to public health or safety. This event is reportable in accordance with 10CFR50.73(a)(2)(iv).

CORRECTIVE ACTIONS

The following corrective actions have been taken as a result of this event:

1. The modified decoder cards have been removed and replaced with unmodified cards. The system has been restored to its original configuration and successfully retested.

ADDITIONAL INFORMATION

There have been no previous similar events reported to the NRC by South Texas Project.