

# The Light company

Houston Lighting & Power

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

April 18, 1994  
ST-HL-AE-4770  
File No.: G26  
10CFR50.73

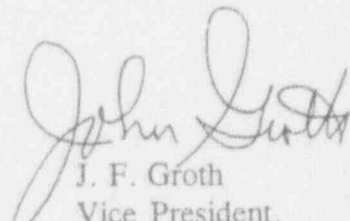
U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555

South Texas Project  
Unit 1  
Socket No. STN 50-498  
Licensee Event Report 94-011  
Inadvertent Actuation of the Safety Injection System  
During Performance of Surveillance Testing

Pursuant to 10CFR50.73, Houston Lighting & Power submits the attached Unit 1 Licensee Event Report 94-011 regarding an inadvertent actuation of the Safety Injection System during performance of surveillance testing. 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.

On April 11, 1994 an extension of the due date of this letter to April 18, 1994 was requested and granted by Mr. W. B. Jones of NRC Region IV.

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  
Vice President,  
Nuclear Generation

260123

JMP/nl

Attachment: LER 94-011 (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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c:

Leonard J. Callan  
Regional Administrator, Region IV  
U. S. Nuclear Regulatory Commission  
611 Ryan Plaza Drive, Suite 400  
Arlington, TX 76011

Lawrence E. Kokajko  
Project Manager  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555 13H15

David P. Loveless  
Sr. Resident Inspector  
c/o U. S. Nuclear Regulatory Comm.  
P. O. Box 910  
Bay City, TX 77404-910

J. R. Newman, Esquire  
Newman, Bouknight & Edgar, P.C.  
STE 1000, 1615 L Street, N.W.  
Washington, DC 20036

K. J. Fiedler/M. T. Hardt  
City Public Service  
P. O. Box 1771  
San Antonio, TX 78296

J. C. Lanier/M. B. Lee  
City of Austin  
Electric Utility Department  
721 Barton Springs Road  
Austin, TX 78704

G. E. Vaughn/C. A. Johnson  
Central Power and Light Company  
P. O. Box 2121  
Corpus Christi, TX 78403

Rufus S. Scott  
Associate General Counsel  
Houston Lighting & Power Company  
P. O. Box 61067  
Houston, TX 77208

Institute of Nuclear Power  
Operations - Records Center  
700 Galleria Parkway  
Atlanta, GA 30339-5957

Dr. Joseph M. Hendrie  
50 Bellport Lane  
Bellport, NY 11713

D. K. Lacker  
Bureau of Radiation Control  
Texas Department of Health  
1100 West 49th Street  
Austin, TX 78756-3189

U. S. Nuclear Regulatory Comm.  
Attn: Document Control Desk  
Washington, D. C. 20555

## 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 (MNBB 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 7

TITLE (4) Inadvertent Actuation of the Safety Injection System during Performance of Surveillance Testing

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
03	10	94	94	-- 011 --	00	04	18	94	FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)	0	20.402(b)	20.405(c)	X	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)(i)		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)(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 Jairo Pinzon - Staff Engineer TELEPHONE NUMBER (Include Area Code) (512) 972-8027

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

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

On March 10, 1994, Unit 1 was in Mode 5 at 0% power while in Mid-Loop operations. At approximately 1725 hours, while conducting a Logic Train S Functional Test, a Safety Injection actuation was received on trains A, B, and C. The following causes have been identified for this event:

- Inconsistent application of established management controls;
- Failure to meet known management expectations;
- Test performer performance lapses; and
- Component malfunction.

Corrective actions and actions taken in response to the component malfunction are discussed within the text of this Licensee Event Report.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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South Texas, Unit 1	05000 498	94	-- 011 --	00	2 OF 7

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

DESCRIPTION OF EVENT:

On March 10, 1994, Unit 1 was in Mode 5 at 0% power while in Mid-Loop operations. At approximately 1725 hours, while conducting a Logic Train S Functional Test, a Safety Injection actuation was received on trains A, B, and C.

During turnover from night shift to day shift on March 10, 1994, the requirement for conducting functional testing of Solid State Protection System logic trains was communicated from the night Shift Supervisor to the on-coming day Shift Supervisor. The tests, however, were not scheduled to occur on that day. At 1315 hours, March 10, 1994, the first test conducted was the Train S Reactor Trip Breaker Trip Actuating Device Operational Test (TADOT). This test was completed satisfactorily at 1524 hours.

Preparations were made to conduct the Solid State Protection System Logic Train S Functional Test. A pre-job briefing was conducted by the test coordinator with operations personnel involved in the test. The pre-job briefing was general in nature and did not cover the procedure in detail. This was the first time these operations personnel had conducted this test using the surveillance procedure in its new format. The format of the procedure had changed, but the technical details were essentially not altered.

Communications were established among personnel at the Solid State Protection System cabinets, Reactor Trip Breakers, and the Control Room. The procedure was conducted satisfactorily through step 5.1.9 which required indication verification in the Train R Logic Cabinet. At this point, the procedure required a transition to Protection System Logic Train S Logic Cabinet to continue testing. However, the transition was not made and subsequent steps within the procedure were actually incorrectly conducted in the Train R Logic Cabinet. At procedure step 5.18, it was perceived by testing personnel that the procedure could not be completed as written because the note preceding step 5.18 directed subsequent steps to be conducted in "Protection System Logic Train S, Logic Cabinet..." The test was stopped and an I & C Supervisor was contacted to determine if testing could be conducted in two Logic Trains concurrently. The I&C Supervisor confirmed that two logic trains should not be tested concurrently. The Shift Supervisor was informed of the apparent procedure problem.

The communication among the Shift Supervisor, the Mid-Loop Coordinator (a Senior Reactor Operator) who had recently conducted the surveillance procedure, and the testing personnel concluded that the procedure was not in error and could be conducted as written. The Shift Supervisor and Mid-Loop Coordinator were not aware that testing was being conducted in the Train R Logic Cabinet instead of the Train S Logic Cabinet. Instructions from the Shift Supervisor were understood by the testing personnel as "continue the test" and inferred that the procedure would be changed later, if necessary.

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

DESCRIPTION OF EVENT: (Cont'd)

Upon returning to the protection cabinets, the testing personnel conducting the test determined that they were testing the wrong train. Shift Supervision was not contacted. The testing personnel proceeded to restore the train. The testing personnel determined that Section 5.18, Memories Check was unnecessary for restoration of the Logic Train and, therefore, it was not performed. Instead, Section 5.20, Restoration and Documentation, was entered for restoration of Logic Train R. At 1725 at approximately step 5.20.8 in the restoration section, a Safety Injection actuation occurred on Trains A, B, and C. All Engineered Safety Features equipment responded as required to the signal with the exception of Chiller 11C which tripped on low oil pressure.

The Safety Injection actuation resulted in the repositioning of the injection valves and the draining of a small amount of borated water from the Refueling Water Storage Tank into the Reactor Coolant System. All Safety Injection Pumps were in pull-to-lock minimizing the quantity of water that entered the Reactor Coolant System. Control Room personnel responded promptly and correctly to the Safety Injection actuation. The operating Residual Heat Removal pump tripped automatically due to the Safety Injection signal and was restarted approximately four minutes later, following Safety Injection Sequencer timeout, with no detectable increase in Reactor Coolant System temperature.

Following the actuation, an Event Review Team was convened and the event was investigated. Investigation results indicated a possible malfunction of the Solid State Protection System since the activities being performed in Protection System Safeguards Test Train B at the time were those that are normally performed in the S Train logic test and should not have initiated a Safety Injection actuation signal.

Actuation Train B was reset but actuation Trains A and C would not reset from the control board. Subsequent troubleshooting of Train A found a failed relay in the reset circuit to be the problem. This was replaced and tested satisfactorily. After some review, it was found that Train C reset had not been attempted and therefore had operated properly.

The activities being performed in the Protection System Safeguards Test Train B as part of the restoration section, should not have caused the actuation. The cause of the Safety Injection was the release of the Safety Injection blocks in Logic Train R. It should be noted that since the Safety Injection blocks were able to be reinstated, the release of the blocks which caused the actuation was intermittent. (The actual failure mechanism that caused the release of the Safety Injection blocks could not be determined.) After all work was completed in the field, a special test was performed. This special test was a modified version of the logic test normally performed, and tested as many logic circuits as possible including tests of all the circuitry related to this event. There were no deficiencies found as a result of this special test.



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

DESCRIPTION OF EVENT: (Cont'd)

The most likely cause of the release of the Safety Injection blocks was an intermittent change of state of the P-11 circuit. The most likely cause of the intermittent change of state of the P-11 circuit is performance of step 5.20.8a feeding back a noise spike through the Protection System Safeguards Test Train B power feed to Train R.

If the cause of the actuation was a noise spike generated when resetting Protection System Safeguards Test Train B (step 5.20.8a), then it is possible that another noise spike generated sometime in the future while performing slave relay tests could have an effect in the logic cabinets which could result in a reactor trip. It should be noted however, that slave relay testing has been performed on a regular basis since first criticality with no problems being seen by the logic trains, possibly due to the different circuit configuration of the blocks used at power. The special test did show that the Solid State Protection System is operable and capable of meeting its safety function.

In addition to investigating the technical aspects of how this event occurred, Management initiated a parallel investigation to review the application of management controls, the communication of management expectations, and the appropriateness of conducting this test in the Mid-Loop condition. Several issues and lessons learned were identified and are covered in the Cause of Event, and Corrective Actions sections of this report.

CAUSE OF EVENT:

The following causes have been identified:

- Inconsistent application of established management controls including the following:
  - Ineffective interface/involvement between shift management and oversight managers.
  - Line management not sufficiently involved in determining the appropriate time to perform the test.
  - Management expectations not adequately defined in the mid-loop procedure, or communicated to shift personnel while in mid-loop operations.
- Failure to meet known management expectations including the following:
  - A failure of shift management to be sensitive to potential loss of shutdown cooling while at Mid-Loop during surveillances.
  - Lack of a questioning attitude on the part of shift management when the test performers reported an apparent procedural deficiency.
  - Failure of test performers to keep shift management fully informed.
  - Failure of test performers to maintain expected level of formality during test conduct.

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

CAUSE OF EVENT: (Cont'd)

- Test performer performance lapses:
  - A failure to adhere to the procedure in that step(s) that directed testing to be performed on Train S were not followed.
  - Self-checking was not applied to ensure the intended actions were performed on the correct components.
- The cause of the Safety Injection actuation was the release of the Safety Injection blocks in Logic Train R. The most likely cause of the release of the Safety Injection blocks was an intermittent change of state of the P-11 circuit. The most likely cause of the intermittent change of state of the P-11 circuit is performance of step 5.20.8 feeding back a noise spike through the Protection System Safeguards Test Train B power feed to Train R.

ANALYSIS OF EVENT:

The unplanned actuation of an Engineered Safety Feature is reportable pursuant to 10CFR50.73(a)(2)(iv). During this event there was no actual safety injection into the reactor coolant system. A small amount of borated water from the Refueling Water Storage Tank drained by gravity feed into the Reactor Coolant System. As such, a Special Report pursuant to Technical Specification 3.5.2 is not necessary.

This event is significant in that:

- Loss of residual heat removal capability for an extended period of time with fuel in the reactor vessel could lead to fuel damage.
- The potential existed for the Safety Injection Pumps to have started and injected water into the Reactor Coolant System resulting in an uncontrollable radiological spill through the open steam generator manways.
- This event demonstrates an inconsistent application of management controls.

To determine the safety significance of this event, a Thermal Hydraulics evaluation was performed to determine the time to boil for the March 10, 1994 Safety Injection actuation event (loss of Residual Heat Removal). The results of the evaluation show that bulk boiling may have occurred 290 minutes (4 hours 50 minutes) after the loss of Residual Heat Removal cooling. This provides sufficient time for operator action per the appropriate operating procedure to mitigate the consequences of this event. Therefore, this event had no impact on the public health and safety or on the integrity of the core/reactor coolant system. The actual safety significance was minimal.

LICENSEE EVENT REPORT (LER)  
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CORRECTIVE ACTIONS:

The following Remedial Actions were immediately taken as a result of this event:

1. Shutdown cooling was restored and Engineered Safety Features systems placed in a safe condition.
2. Personnel involved were removed from the watchbill pending completion of the investigation.
3. The event was discussed with the oncoming shifts.
4. An Event Review Team was convened to investigate all aspects of the event.
5. The trip of Chiller 11C was investigated. A clogged filter was determined to be the cause of the trip and was replaced. A review of operating procedures showed that the existing watch logging requirements of chiller oil pressure provides sufficient monitoring to determine filter loading and to cause action to be taken before a chiller trip on low oil pressure could occur. However, the pressure criterion has been changed in the procedure from 20 psig to 60 psig.
6. A special test of the Solid State Protection System was conducted to assure operability of the system.

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

1. Individual discussions of responsibility were conducted with Startup Duty Managers (prior to assuming duties). (Complete)
2. Individual letters reemphasizing responsibilities were given to Startup Duty Managers. (Complete)
3. Startup Duty Managers are assigned only from Managers within the Generation Organization. (Complete)
4. Lessons learned briefings were conducted with all operating crews by involved personnel prior to assuming shift duties. (Complete)
5. Expanded administrative controls have been implemented to screen activities on actuation risk systems or procedures prior to use. (Ongoing)
6. Comprehensive screening of surveillance tests will be performed for actuation risk and incorporation of requirements for pre-test briefings/supervisory oversight based on specific risk. (Ongoing)
7. High and medium risk activities that have been scheduled will be reviewed and management attention will be increased. (Ongoing)



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

CORRECTIVE ACTIONS: (Cont'd)

8. Management lessons learned from this event was provided to all site managers for discussion with their personnel stressing the significance of this event. (Complete)
9. The mid-loop procedure will be revised to incorporate lessons learned regarding surveillance procedure performance and challenges to shutdown cooling. This procedure will be revised prior to its next use.
10. Action was taken consistent with Constructive Discipline Program for individuals involved in the event whose performance did not meet expected standards. (Complete)

ADDITIONAL INFORMATION:

Unit 1 Licensee Event Report 88-059 regarding an inadvertent actuation of a High Head Safety Injection pump due to operator error was submitted in November 4, 1988. In addition, Safety Injection actuations have occurred as the result of reactor trips. During these events, the Safety Injection system functioned as expected.