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

February 23, 1995
ST-HL-AE-5004
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 95-001
Reactor Trip and Turbine Trip due to Low-Low Steam Generator Level

Pursuant to 10CFR50.73, Houston Lighting & Power submits the attached Unit 1 Licensee Event Report 95-001 regarding a reactor trip and turbine trip due to low-low Steam Generator level. 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
Vice President,
Nuclear Generation

JMP/lf

Attachment: LER 95-001 (South Texas, Unit 1)

IE22

c:

Leonard J. Callan
Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8084

Thomas W. Alexion
Project Manager
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001 13H15

David P. Loveless
Sr. Resident Inspector
c/o U. S. Nuclear Regulatory Comm.
P. O. Box 910
Bay City, TX 77404-0910

J. R. Newman, Esquire
Morgan, Lewis & Bockius
1800 M Street, N.W.
Washington, DC 20036-5869

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

Richard A. Ratliff
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. 20555-0001

J. R. Egan, Esquire
Egan & Associates, P.C.
2300 N Street, N.W.
Washington, D.C. 20037

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
South Texas Unit 1	05000 498	1 OF 5

TITLE (4) Reactor Trip and Turbine Trip due to Low-Low Steam Generator Level

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
01	24	95	95	-- 001 --	00	02	23	95		05000
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	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	TELEPHONE NUMBER (Include Area Code)
Jairo Pinzon - Staff Engineer	(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)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO				

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

On January 24, 1995, Unit 1 was in Mode 1 at 100% power. At approximately 1528 hours, Unit 1 experienced a reactor trip due to Low-Low Steam Generator Level on 1C Steam Generator after the loss of Main Feedwater Pump 13. The initiating cause of this event was a failed thrust bearing wear probe assembly which caused signal spiking resulting in the generation of a trip signal to the Feedwater Pump Control System. Power reduction could not be accomplished rapidly enough to prevent a reactor scram from low Steam Generator level. Corrective actions include replacing the thrust bearing wear probe assembly, providing lessons learned from this event to Unit 1 and Unit 2 operations personnel, and incorporating empirical data of key primary and secondary system parameters from two Unit 1 loss of Feedwater Pump events into the newly acquired simulator model.

DESCRIPTION OF EVENT:

On January 24, 1995, Unit 1 was in Mode 1 at 100% power. At approximately 1528 hours, Unit 1 experienced a reactor trip due to Low-Low Steam Generator Level on 1C Steam Generator after the loss of Main Feedwater Pump 13.

On January 23, 1995, the Start-up Feedwater Pump, a non-safety related system, was removed from service for scheduled maintenance to correct a deteriorated material condition of the inboard mechanical seal. With the removal from service of the Start-up Feedwater Pump, the applicable off-normal operating procedure, "Loss of Feedwater Flow or Control" was reviewed and appropriate corrective actions for a loss of a Main Feedwater Pump were discussed with watch standing personnel. The moisture Separator Reheater was being controlled in the manual mode due to intermittent alarms caused by loose relay contacts in the control circuit.

On January 24, 1995, at approximately 0900 hours, a locked in alert alarm for thrust bearing wear on Main Feedwater Pump 13 was discovered at the local control panel. Main Feedwater Pump 13 vibration readings indicated normal bearing operation. Additional comparison readings were taken with the other feedwater pump bearings. No abnormal indications were received leading to the conclusion that the cause of the alarm condition was calibration drift of the thrust bearing wear indicator module.

At approximately 1526 hours, Steam Generator steamflow/feedflow mismatch alarms were received in the Control Room for all Steam Generators and Main Feedwater Pump 13 turbine indicated decreasing speed. Immediate actions included placing Main Turbine Governor controls in manual and decreasing generator load, verifying Steam Generator Feedwater Regulating Valves were full open, starting a standby feedwater booster pump, and placing the Rod Control System in automatic. Steam Generator levels were approximately 60% when the alarms were received and the load reduction was initiated.

When generator load reached 1000 Megawatts and Steam Generator levels were approximately 40%, steamflow and feedflow appeared nearly matched. An additional 50 to 100 Megawatts reduction was ordered for additional margin. Several steam dump valves were still open and a six degree difference between reactor coolant average temperature and reference temperature (average temperature was higher) existed. Rod movement was slower than expected for a six degree difference in temperatures. Subsequent investigation determined that slow rod movement in automatic for these conditions was per design due to a small temperature difference rate of change. The rods were placed in manual operation and inserted to decrease primary average temperature to match reference temperature.

DESCRIPTION OF EVENT: (Continued)

At this point in the transient, Steam Generator levels were indicated on the control board to be approximately 36%. Steam Generators 1B and 1D levels were increasing; however, Steam Generator 1A and 1C levels appeared nearly steady. At 1528 hours, the plant experienced a reactor scram on low-low Steam Generator level in Steam Generator 1C.

Subsequent to the reactor scram, a Reactor Coolant System cooldown was experienced due to the lifting of a relief valve on High Pressure Feedwater Heater 11A. The relief was lifted due to the Moisture Separator control being in the manual mode. The lifting relief was identified and the Moisture Separator controls were placed in automatic which resulted in reseating the feedwater heater relief valve, terminating the cooldown.

CAUSE OF EVENT:

The initiating cause of this event was a failed thrust bearing wear probe assembly which caused signal spiking resulting in the generation of a trip signal to the Feedwater Pump Control System.

The causes of the reactor trip are as follows:

Personal experiences and observation of successful crew response to both real and simulated, loss of feedwater transients led management to remove the Startup Feedwater Pump from service without reducing reactor power.

The Off-Normal procedure for Loss of Feedwater Flow or Control was too restrictive by directing Turbine operation in "Manual--Slow." This did not allow the flexibility to respond in a more appropriate manner for the type of transient that was experienced.

ANALYSIS OF EVENT

Reactor trips and Engineered Safety Features actuations are reportable pursuant to 10CFR50.73(a)(2)(iv). All Engineered Safety Features systems functioned as designed. Auxiliary Feedwater actuated on low Steam Generator level and Feedwater Isolation actuated on low average reactor coolant temperature coincident with a reactor trip. There were no adverse safety or radiological consequences of this event.

CORRECTIVE ACTIONS:

1. The thrust bearing wear probe assembly on Main Feedwater Pump 13 has been replaced.

2. During future Start-up Feedwater Pump out of service periods, reactor power will be limited to 90% unless authorized to maintain a higher power by the Plant Manager. This action will remain in effect until corrective action 5 has been completed and confidence gained that a loss of Feedwater Pump can be managed.

3. The Loss of Feedwater Flow or Control off-normal procedure has been revised to delete "in SLOW" from step 5b.

4. Lessons learned from this event were provided to Unit 1 and Unit 2 watch standing personnel. Lessons learned included a discussion of this event, dynamics of the Rod Control System, and differences between the simulator model and actual plant response with respect to this event. In addition, lessons learned from this event will be provided to the operating crews during the next licensed operator requalification cycle.

5. Empirical data of key primary and secondary system parameters (Rod Control, Steam Generator dynamics, etc.) from two Unit 1 Loss of Feedwater Pump events will be incorporated into the new simulator. When the new simulator becomes operational, a scenario representing the loss of Feedwater Pump transients will be presented to licensed operating personnel as scheduled by the Licensed Operator Requalification Two-Year Training Plan.

6. The Initial Licensed Operator Training lesson plan will be revised to include additional information on Rod Control System dynamics. This action will be completed by May 7, 1995.

ADDITIONAL INFORMATION:

Houston Lighting & Power is currently upgrading the simulator to improve its capability and fidelity. The simulator upgrade is scheduled to be completed in July 1995.

As a result of the Unit 1 reactor trip in September 1994 (Unit 1 Licensee Event Report 94-015), lessons learned were provided to operations personnel which re-emphasized the need to use all indications to verify successful equipment operation and the need for adequate crew communications. In addition, a scenario similar to the September 1994 trip is being developed for use on the upgraded simulator.

A design modification to replace the Feedwater Pump Turbine speed controls is scheduled to be implemented in the upcoming refueling outage commencing in March 1995. This upgrade will improve overall system reliability. This modification was implemented in Unit 2 during the last refueling outage. (This was previously committed to in Unit 1 Licensee Event Report 94-015.)

ADDITIONAL INFORMATION: (Continued)

Previous events that have been reported by the South Texas Project to the Nuclear Regulatory Commission within the last three years regarding a reactor trip as a result of low Steam Generator level were:

Unit 2 Licensee Event Report 92-003 regarding a reactor trip on February 24, 1992. The cause of that event was rainwater intrusion through the expansion joints in the Turbine Generator Building roof and into the Electro-hydraulic Control cabinet.

Unit 2 Licensee Event Report 93-004 regarding a reactor trip due to low Steam Generator water level. The cause of that event was determined to be ineffective action to correct failures of the Start-up Feedwater Pump, Steam Driven Feedwater Pumps and Feedwater Isolation Bypass valves. The failure to effectively correct the root cause of these problems resulted in the unnecessary loss of availability and reduced unit reliability.

Unit 1 Licensee Event Report 94-009 regarding a manual reactor trip due to low Steam Generator level. The cause of that event was an I/P converter failure in the control loop for the 1D Feedwater Regulating Valve.

Unit 1 Licensee Event Report 94-015 regarding a reactor trip and turbine trip due to low-low Steam Generator level. The causes of that event were inadequate: management expectations, procedural guidance, training and personnel experience. These conditions caused initial emphasis to be placed on expected plant response rather than actual plant conditions.