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

February 22, 1993
ST-HL-AE-4341
File No.: G26
10CFR50.73

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

South Texas Project
Unit 2
Docket No. STN 50-499
Licensee Event Report 93-001
Reactor Trip Due to Failure of a Main Turbine
Electro-Hydraulic Control Line

Pursuant to 10CFR50.73, Houston Lighting & Power (HL&P) submits the attached Unit 2 Licensee Event Report 93-001 regarding a reactor trip due to failure of a Main Turbine Electro-Hydraulic Control line. This event did not have an adverse effect on the health and safety of the public.

If you should have any questions on this matter, please contact Mr. J. M. Pinzon at (512) 972-8027 or me at (512) 972-7921.

W. H. Kinsey, Jr.
Vice President,
Nuclear Generation

JMP/sr

Attachment: LER 93-001 (South Texas, Unit 2)

010112

IE22

cc:

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U.S. Nuclear Regulatory Comm.
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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 2	05000 499	1 OF 06

TITLE (4): Reactor Trip Due to Failure of a Main Turbine Electro-Hydraulic Control Line

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
01	23	93	93	001	00	02	22	93		05000
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)	100		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)(iv)		50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Jairo Pinzon - Senior 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
X	YES (If yes, complete EXPECTED SUBMISSION DATE)		NO		04	21	93

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

On January 23, 1993, Unit 2 was in Mode 1 at 100% power. At 2324 hours, Unit 2 automatically tripped from full power due to a turbine trip above the P-9 (50% power) setpoint as the result of a depressurization of the Electro-Hydraulic Control (EHC) supply header. The low EHC System pressure was due to a leak on the low pressure governor valve line of the Steam Generator Feedwater Pump (SGFP) #22. The failure initiated from shallow intergranular cracks on the inner surface of the tube which grew radially outward and then around the circumference of the tube by fatigue. Rapid changes in the valve position created excessive movement within the valve and low pressure line. The excessive movement is apparently the result of an exposed wire on the Linear Variable Differential Transformer (LVDT). Corrective actions include replacing the failed EHC line and the LVDT and performing a failure analysis on the failed section of the EHC line and on the LVDT.

REQUIRED NUMBER OF DIGITS/CHARACTERS
FOR EACH BLOCK

BLOCK NUMBER	NUMBER OF DIGITS/CHARACTERS	TITLE
1	UP TO 46	FACILITY NAME
2	8 TOTAL 3 IN ADDITION TO 05000	DOCKET NUMBER
3	VARIES	PAGE NUMBER
4	UP TO 76	TITLE
5	6 TOTAL 2 PER BLOCK	EVENT DATE
6	7 TOTAL 2 FOR YEAR 3 FOR SEQUENTIAL NUMBER 2 FOR REVISION NUMBER	LER NUMBER
7	6 TOTAL 2 PER BLOCK	REPORT DATE
8	UP TO 18 -- FACILITY NAME 8 TOTAL -- DOCKET NUMBER 3 IN ADDITION TO 05000	OTHER FACILITIES INVOLVED
9	1	OPERATING MODE
10	3	POWER LEVEL
11	1 CHECK BOX THAT APPLIES	REQUIREMENTS OF 10 CFR
12	UP TO 50 FOR NAME 14 FOR TELEPHONE	LICENSEE CONTACT
13	CAUSE VARIES 2 FOR SYSTEM 4 FOR COMPONENT 4 FOR MANUFACTURER NPRDS VARIES	EACH COMPONENT FAILURE
14	1 CHECK BOX THAT APPLIES	SUPPLEMENTAL REPORT EXPECTED
15	6 TOTAL 2 PER BLOCK	EXPECTED SUBMISSION DATE

DESCRIPTION OF EVENT:

On January 23, 1993, Unit 2 was in Mode 1 at 100% power. At 2324 hours, Unit 2 automatically tripped due to a turbine trip above the P-9 (50% power) setpoint. The Main Turbine tripped due to a low Electro-Hydraulic Control (EHC) pressure below the 1350 psig setpoint. The depressurization was caused by a failure on the EHC supply line to the low pressure governor valve for Steam Generator Feedwater Pump (SGFP) #22.

The section of fractured tube/fitting assembly is being analyzed. Initial findings indicate a failure in the tube material in the vicinity of the fillet weld connection between the tube and the fitting. The fracture initiated from shallow intergranular cracks on the inner surface of the tube which grew radially outward and then around the circumference of the tube by fatigue.

Following repairs on January 28, 1993, excessive motion of SGFP #22 was observed on the high pressure supply line to the low pressure governor valve and in the governor valve itself. Chart recordings revealed intermittent spiking. The Linear Variable Differential Transformer (LVDT) which provides the feedback signal to the electronic controller to confirm valve position was replaced. SGFP startup was initiated and no abnormal line vibrations or valve motions were found. Visual inspection of the replaced LVDT identified a section of bare wiring. The LVDT will be sent to the original manufacturer for failure mode analysis.

During this event, AFW pump #24 started and provided flow to the Steam Generator as required. While manually tripping the Auxiliary Feedwater (AFW) Pump #24 from the Control Room, a mechanical overspeed trip condition was indicated, however, no actual overspeed condition existed. An assessment of the AFW overspeed trip linkage revealed that when the machine was tripped electrically from the Control Room, the trip/throttle valve would go shut as designed, but the latch mechanism on the overspeed trip indication device was becoming unlatched. The unlatching occurred when the pump was electrically tripped from the Control Room. Additionally, a conflict was noted between the Vendor Manual and HL&P procedures with regards to the methods used for tripping the AFW Turbine.

DESCRIPTION OF EVENT: (Con't)

During this event, an additional problem was identified with the Startup Feedwater Pump recirculation valve which failed to open, causing feedwater flow oscillations between 0 to 4000 gpm. The Startup Feedwater Pump was subsequently secured and the recirc valve was opened. The Startup Feedwater Pump was restarted and feedwater to the steam generators was established.

CAUSE OF EVENT:

The cause of the reactor/turbine trip is the result of a failure of an Electro-Hydraulic Control line of the SGFP #22 causing a low EHC system pressure trip. The failure initiated from shallow intergranular cracks on the inner surface of the tube which grew radially outward and then around the circumference of the tube by fatigue. It is hypothesized that an exposed wire on the LVDT caused intermittent electrical signals producing rapid changes in the low pressure governor valve position, thus, creating excessive movement within the valve and the low pressure line.

The cause of the mechanical overspeed indication of the AFW #24 pump was a misadjustment in the trip linkage which, when securing the pump electrically, caused the latch mechanism to become unlatched.

The cause of the Startup Feedwater Pump recirculation valve failure to open was determined to be valve leakage which caused the valve to become unbalanced and close, or remain closed, with upstream pressure. Valve leakage was attributed to scoring of the valve plug and body.

ANALYSIS OF EVENT:

This event is reportable pursuant to 10CFR50.73(a)(2)(iv). There were no adverse radiological or safety consequences as a result of this event. All Engineered Safety Systems functioned as designed, with the exception of the problems that were encountered while manually tripping the AFW pump #24 which resulted in a mechanical overspeed trip indication.

CORRECTIVE ACTIONS:

The following corrective actions have been or will be taken as the result of the reactor trip:

1. The failed EHC line was replaced.

2. The failed section of EHC line was sent offsite for failure analysis. Preliminary information indicates that the fracture initiated from shallow intergranular cracks on the inner surface of the tube which grew radially outward and then around the circumference of the tube. Additional corrective actions will be determined upon evaluation of the final report. Corrective actions will be addressed in a supplemental report to be submitted by April 21, 1993.

3. Additional non-destructive examinations were taken of similar welds within the EHC system. No generic problems were identified.

4. The Linear Variable Differential Transformer has been replaced and the original LVDT will be sent offsite for failure analysis. The supplemental report will document the results of the failure analysis.

CORRECTIVE ACTIONS: (Con't)

The following corrective actions have been or will be taken as the result of the AFW pump overspeed indication:

1. The larger size pin was approved by Engineering and adjustments were made to the mechanical overspeed linkage clearance and the pull force on the spring.

2. HL&P will revise applicable AFW procedures to ensure these procedures adequately address securing the AFW pump. The Operations related procedures will be revised prior to restart (Mode 2) of either unit. The applicable surveillance procedures will be revised prior to the next performance of the surveillance.

The following corrective action has been taken on the Startup Feedwater Pump recirculation valve:

1. The Startup Feedwater Pump recirculation valve was disassembled, inspected, cleaned and reworked. Additionally, the plug seal and plug were replaced. Upon completion of these troubleshooting activities, the valve was satisfactorily stroked.

ADDITIONAL INFORMATION:

There have been three previous events involving reactor trips associated with the Electro-Hydraulic Control System. The LERs are as follows:

Unit 1 LER 89-001 regarding a reactor trip due to a failure in the Electro-Hydraulic Control circuit which caused the Main Turbine throttle valve to close. The cause of this failure was attributed to a poorly crimped lug on a vendor supplied circuit card.

Unit 2 LER 90-005 regarding a reactor trip due to a loss of EHC fluid caused by a weld failure which was caused by governor valve induced vibration. The cause of the governor valve vibration was determined to be valve plug rotation.

ADDITIONAL INFORMATION: (Con't)

Unit 1 LER 90-015 regarding a reactor trip due to a loss of EHC pressure caused by oscillation in the Main Turbine governor valve. Oscillations were caused by a loose connection in the control circuit.