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

September 25, 1996
ST-HL-AE-5474
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 96-003
Failure to Fully Meet the Requirements of Technical Specification Due to the Discovery of an Improperly Installed Jumper on a Main Steam Line Pressure Lead/Lag Circuit Card

Pursuant to 10CFR50.73, South Texas Project submits the attached Unit 2 Licensee Event Report 96-003 regarding a failure to fully meet the requirements of Technical Specification due to the discovery of an improperly installed jumper on a Main Steam Line Pressure Lead/Lag circuit card. 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. S. M. Head at (512) 972-7136 or me at (512) 972-7988.

R. E. Masse
Plant Manager,
Unit 2

010026

JMP/

Attachment: LER 96-003 (South Texas, Unit 2)

1/1
IE22

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

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NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), 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)

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TITLE (4)

Failure to Fully Meet the Requirements of Technical Specification Due to the Discovery of an Improperly Installed Jumper on a Main Steam Line Pressure Lead/Lag Circuit Card

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
08	28	96	96	-- 003 --	00	09	25	96		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)

	20.2201(b)		20.2203(a)(2)(v)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
	20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Scott M. Head - Sr. Consulting Engineer	(512) 972-7136

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 August 28, 1996, at 1221 hours, Unit 2 was in Mode 1 at 100% power. A reportability review was completed which determined that a condition involving a mispositioned jumper on a lead/lag circuitry card associated with a Steam Generator 2D Pressure Loop, was reportable. The cause of inappropriately leaving the jumper in the incorrect position was inattention to detail. In addition, a contributing cause was that the restoration section of the surveillance procedure did not adequately test to ensure the correct post-surveillance configuration. Corrective actions include reperforming the Analog Channel Operational Test verifying that the jumper was left in the correct position following the performance of the test, verifying that the remaining loops were in the correct configuration, discussing this event and lessons learned from this event with the Instrumentation & Control personnel, and enhancing the Analog Channel Operational Test procedure to perform additional testing to validate post-surveillance jumper configuration.

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

DESCRIPTION OF EVENT:

On August 28, 1996, at 1221 hours, Unit 2 was in Mode 1 at 100% power. A reportability review was completed which determined that a condition involving a mispositioned jumper on a lead/lag circuitry card associated with a Steam Generator 2D Pressure Loop, was reportable.

On August 27, 1996, at 1351 hours, during performance of the quarterly Analog Channel Operational Test for the Steam Generator 2D Pressure Loop P-0546, it was discovered that a jumper had been inadvertently left in a position which removed the lead/lag function of the loop from the circuit contrary to the requirements of Technical Specifications 3.3.2. The lead/lag function serves to provide a dynamic output to the actuation signal for a Main Steam Isolation and a Low Steam Line Safety Injection.

On June 8, 1996, Unit 1 was in week three of a refueling outage and Unit 2 was at 100% power. Two Instrumentation & Control technicians (1 journeyman and 1 apprentice)were assigned work to perform four Main Steam Pressure Analog Channel Operational Tests in Unit 2. The Main Steam Pressure Analog Channel Operational Test consists of verifying and re-establishing accuracy's of the alarms and or trip functions associated with the Main Steam Compensated Steam Line Pressure-Low (Safety Injection and Steam Line Isolation) and Steam Line Pressure Negative Rate-Hi (Steam Line Isolation). The actual steps required to perform this Analog Channel Operational Test include: removing the channel from service, removing a lead/lag circuit card, recording the "As Found" jumper configuration, disconnecting the jumper between the termination point (TP3) and a "variable" termination point, and connecting between termination point (TP3) and a "fixed" termination point, re-installing the lead/lag circuit card and performing a test.

Restoration consists of removing the lead/lag circuit card and disconnecting the jumper from TP3 and the "fixed" termination point and connecting the jumper between TP3 and the "variable" termination point (Design Configuration). This restoration requires dual verification. The next action in the Analog Channel Operational Test requires re-installing the lead/lag circuit card and performing a continuity verification by adjusting the input and verifying that the bistable lamps change state. The Loop is then returned to service which completes the channel test.

Subsequently, on August 27, 1996, the fourth quarterly Analog Channel Operational Tests were being performed as scheduled when it was discovered that the "As Found" position of the TP3 jumper for the loop 2D Main Steam Line pressure circuit card was not in its proper configuration. Upon discovery of this condition, the channel was declared inoperable. Subsequently, this channel has been declared operable following successful completion of the Analog Channel Operational Test surveillance.

Although the Main Steam Isolation signal was not totally disabled from the circuitry during this event, the lead/lag function was inoperable, requiring additional time to generate a Trip Signal from this channel. This configuration left the lead/lag function in a less conservative 2/2 logic.

A review of equipment history showed that no other maintenance had been performed since the Analog Channel Operational Tests on June 8, 1996.

CAUSE OF EVENT:

The cause of inappropriately leaving the jumper in the incorrect position was inattention to detail. The Analog Channel Operational Test procedure has steps for restoration of the jumper to the appropriate position prior to completion. In addition this procedure contains a step for dual verification of the correct position. However, neither of the steps were performed accurately and as such this condition went undetected until the next performance of the quarterly Analog Channel Operational Test.

A contributing cause to this event was that the restoration section of the surveillance procedure did not adequately test to ensure the correct post-surveillance configuration. The restoration section relied on dual verification versus some form of dynamic testing to ensure correct jumper position.

ANALYSIS OF EVENT:

Failure to fully meet the requirements of Technical Specification is reportable to the Nuclear Regulatory Commission pursuant to 10CFR50.73(a)(2)(i)(B). During performance of the quarterly Analog Channel Operational Test for the Steam Generator 2D Pressure Loop P-0546, it was discovered that a jumper had been inadvertently left in a position which removed the lead/lag function of the loop from the circuit contrary to the requirements of Technical Specifications 3.3.2. The lead/lag function serves to provide a dynamic output to the actuation signal for a Main Steam Isolation and a Low Steam Line Safety Injection.

Each main steam line contains three steam line pressure channels. The channels are configured in a two out of three logic in the Solid State Protection System. The Solid State Protection System combines each steam line inputs into a one our of four actuation logic sequence. Upon receipt of a two out of three low pressure signal from any one steam line, the Solid State Protection System initiates a safety injection and a main steam line isolation.

The actuation circuitry of this card initiates a main steam isolation simultaneously with a safety injection in response to a decreasing steam line pressure. Part of the control circuit includes a lead/lag function which is used to anticipate a transient to isolate the main steam line in case of a secondary side high energy line break. The steam line isolation function and safety injection actuation are simultaneously generated as part of the Engineered Safety Features to protect against secondary system line breaks. These protective functions are actuated when two of three steam line pressure channels drop to a setpoint of 735 psig. Upon receipt of a main steam line isolation signal, all steam line isolation valves and steam line bypass valves are closed to prevent continuous, uncontrolled steam generator blowdown. The steam line pressure channels are lead/lag compensated to anticipate the plant's response to the transient. The steam line isolation in conjunction with the Safety Injection is used as the primary Engineered Safety Features mitigation function following a secondary system high energy line break.

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

ANALYSIS OF EVENT: (Continued)

The South Texas Project performed a safety evaluation to determine the impact of the lead/lag portion of a single channel of compensated low steam line pressure in loop 2D being disabled. Since Unit 2 was at or near full power during the period when the function was disabled, only accidents from full power were considered. The only situation under which the design basis accidents could be impacted would occur in the unlikely event of (1) a single failure disabling one of the two unaffected safety channels in loop 2D, and (2) a steam line break occurring in loop 2D. Under such a situation, the protective action would be delayed until the actual steam line pressure decreased to the setpoint of 735 psig, or another protective action occurred.

The compensated low steam line pressure function provides protection against Departure from Nucleate Boiling, and against equipment damage inside and outside of containment due to overheating. The protective function mitigates the return to power associated with a steam line break by initiating safety injection which injects negative reactivity in the form of boron. The protective function also decreases the mass and energy release by isolating the main steam lines. The following discusses the impact of the disabled compensated low steam line feature on the above criteria for design basis events:

The design basis analysis shows that protection against Departure from Nucleate Boiling is provided by Over Power Delta Temperature reactor trip function for steam line breaks at full power that are less than 1.07 ft^2. Breaks greater than 1.07 ft^2 are protected by the compensated low steam line pressure feature. A review of the available margin to Departure from Nucleate Boiling shows if the low compensated steam line pressure feature were disabled, the Over Power Delta Temperature feature would still ensure Departure from Nucleate Boiling would not drop below the acceptance limit. In addition, the "pressurizer pressure low" Safety Injection is expected to occur shortly after the reactor trip due to the cooling of the Reactor Coolant System. This is expected to provide sufficient negative reactivity to accommodate any return to criticality that may occur. Therefore, the disabled compensated low steam line pressure function did not impact the ability of the South Texas Project to show protection against Departure from Nucleate Boiling.

The design basis for a double ended main steam line break at full power assumes the compensated low steam pressure function occurs at approximately 1.35 seconds. This is the limiting accident with regard to peak containment temperature. For smaller breaks that do not actuate the compensated low steam pressure function, credit is taken for the Containment pressure HI-1 and HI-2 functions to provide protection. Actuation of the HI-1 function results in a safety injection signal and actuation of the HI-2 function results in a main steam line isolation signal. The setpoint for these functions is 3.0 psig and increased to 5.5 psig for the analysis to account for uncertainties. To assess the impact of a delay in the compensated low steam pressure function, the containment pressure temperature response was calculated for the limiting design basis accident assuming the compensated low steam pressure function did not actuate. The results show that the HI-1 and HI-2 function would occur at 2.7 seconds which is approximately 1.35 seconds later than for the design basis accident. By relying on HI-1 and HI-2 to provide the safety function, a slight increase in containment temperature occurs. However, this increase is still below the limits of the equipment qualification. The small increase in containment temperature was also found not to have a significant impact on the containment structure and other safety related containment equipment. Therefore, the disabled compensated low steam line pressure function did not impact the ability of the South Texas Project to show protection for equipment inside containment.

ANALYSIS OF EVENT: (Continued)

The impact of a delay in the compensated low steam pressure function was also assessed for a main steam line break outside of containment. The concern for this event is that the equipment qualification limits in the Isolation Valve Cubicle could be exceeded. The South Texas Project performed an evaluation to determine the resulting temperature in the Isolation Valve Cubicle for the case where the compensated low steam pressure was not actuated until the actual pressure reached the setpoint. The analysis assumes a reactor trip would occur due to a Over Power Delta Temperature reactor trip. Main steam isolation would not occur until the pressure in the steam line decreased to the compensated low steam line set point of 735 psig. A value of 505 psig was assumed to account for uncertainties. The results of the analysis showed that the Isolation Valve Cubicle compartment analysis would not exceed the temperature for which the equipment is qualified. This is primarily due to the fact that the blowout panel located on the top of the compartment releases sufficient energy to limit the increase in temperature inside the compartment. Therefore, the disabled compensated low steam line pressure function did not impact the ability of the South Texas Project to show protection for equipment inside the Isolation Valve Cubicle.

The final concern of a delay in the compensated low steam pressure function is a potential impact on the calculated offsite dose releases. The design basis analysis assumes 1% of the fuel is failed prior to the steam line break event and a total of 5% of the fuel fails concurrent with the event. Chemistry samples show that there were no fuel failures or iodine spikes during the period when the compensated low steam pressure function was disabled. As discussed above, no Departure from Nucleate Boiling is expected, and therefore no fuel failure is expected as a result of a steam line break. Therefore, the offsite dose that may occur due to a main steam line break during the period when the compensated low steam line pressure function was disabled is expected to be below that presented in the UFSAR.

In conclusion, the evaluation considered the impact to Departure from Nucleate Boiling, equipment damage inside and outside of containment due to overheating, and offsite dose consequences during a steam line break event. The results of the evaluation show that the disabled compensated low steam line pressure function did not impact the safety of the South Texas Project. There were no adverse safety or radiological consequences from this event.

CORRECTIVE ACTIONS:

The following actions were taken immediately following the discovery of this condition:

1) An Analog Channel Operational Test was performed satisfactorily. The jumper was left in the correct position.

2) Analog Channel Operational Tests were performed on the remaining loops in question, jumpers were found in their designed configuration.

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CORRECTIVE ACTIONS: (Continued)

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

1) Personnel issues have been addressed in accordance with approved company policies.

2) The lessons learned from this event have been presented to Instrumentation & Control personnel.

3) Additional enhancements to the Analog Channel Operational Test procedures are being incorporated to perform additional restoration testing to validate post surveillance jumper configuration. This enhancement will be incorporated into the Main Steam Line procedures prior to the next performance of these surveillances.

4) A review of similar type surveillance testing procedures determined that a similar manipulation of a jumper was required for the Pressurizer pressure surveillance testing. The enhancement described in action 3, will also be incorporated into the Pressurizer Pressure procedures prior to the next performance of these surveillances.

ADDITIONAL INFORMATION:

There have been no similar problems, related to mispositioned jumper due to the failure of a dual verification, previously submitted by the South Texas Project to the Nuclear Regulatory Commission.

Nuclear Regulatory Commission Information Notice 85-98, "Missing Jumpers From Westinghouse Reactor Protection System Cards for the Over-Power Delta Temperature Trip Function," was issued in December 26, 1985. This Information Notice dealt with a similar type problem which went undetected. The review of this information notice by the South Texas Project performed in early 1986, appears to have focussed on dual verification.