

The Light company

Houston Lighting & Power

P.O. Box 1700 Houston, Texas 77001 (713) 228-9211

December 20, 1990

ST-HL-AE-3657

File No.: G26

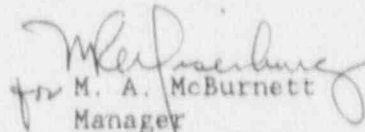
10CFR50.73

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

South Texas Project Electric Generating Station
Unit 1
Docket No. STN 50-498
Licensee Event Report 90-025
Regarding Reactor Trip Due
to a Generator Ground Fault Relay
Actuation Caused by a Stator Coil End Turn Failure

Pursuant to 10CFR50.73, Houston Lighting & Power Company (HL&P) submits the attached Licensee Event Report (LER 90-025) regarding a reactor trip due to a generator ground fault relay actuation caused by a stator coil end turn failure. This event did not have any adverse impact on the health and safety of the public.

If you should have any questions on this matter, please contact Mr. C. A. Ayala at (512) 972-8628 or myself at (512) 972-8530.


for M. A. McBurnett
Manager
Nuclear Licensing

RAD/sgs

Attachment: LER 90-025 (South Texas, Unit 1)

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11

Houston Lighting & Power Company
South Texas Project Electric Generating Station

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cc:

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Revised 10/08/90

L4/NRC/

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) South Texas, Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 4 9 8 1	PAGE (3) 1 OF 0 4
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TITLE (4) **Reactor Trip Due to a Generator Ground Fault Relay Actuation
Caused by a Stator Coil End Turn Failure**

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 NAMES		DOCKET NUMBER (8)			
1	1	2	4	9	0	9	0	0	2	5	0	0	0	0
1	1	2	4	9	0	9	0	0	1	2	2	0	9	0
OPERATING MODE (9) 1 THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11): 20.402(b) <input type="checkbox"/> 20.406(a) <input checked="" type="checkbox"/> 50.73(a)(2)(iv) <input type="checkbox"/> 73.71(b) <input type="checkbox"/> POWER LEVEL (10) 100 20.406(a)(1)(ii) <input type="checkbox"/> 50.73(a)(1) <input type="checkbox"/> 50.73(a)(2)(v) <input type="checkbox"/> 73.71(c) <input type="checkbox"/> 20.406(a)(1)(iii) <input type="checkbox"/> 50.73(a)(2) <input type="checkbox"/> 50.73(a)(2)(vi) <input type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A) <input type="checkbox"/> 20.406(a)(1)(iv) <input type="checkbox"/> 50.73(a)(2)(iii) <input type="checkbox"/> 50.73(a)(2)(vii)(A) <input type="checkbox"/> 20.406(a)(1)(v) <input type="checkbox"/> 50.73(a)(2)(iv) <input type="checkbox"/> 50.73(a)(2)(viii)(B) <input type="checkbox"/> 20.406(a)(1)(vi) <input type="checkbox"/> 50.73(a)(2)(v) <input type="checkbox"/> 50.73(a)(2)(ix) <input type="checkbox"/>														

LICENSEE CONTACT FOR THIS LER (12)

NAME Charles Ayala - Supervising Licensing Engineer	TELEPHONE NUMBER AREA CODE 5 1 2 NUMBER 9 7 2 - 8 6 2 8
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC
B	TJ	GEN	W120	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)
		MO. DAY YEAR 0 4 3 0 9 1

ABSTRACT (Limit to 1400 spaces, i.e. 3500 characters by fifteen single-space typewriter lines) (16)

On November 24, 1990, Unit 1 was in Mode 1 at 100% power. At 1448 hours, the generator running ground fault relay actuated due to a stator coil end turn failure which initiated an automatic reactor trip. All systems responded as expected with no Engineered Safety Features actuations. Initial internal inspection of the generator revealed damage to the end turn of stator coil #20 at the turbine end. The ground fault relay actuation was due to electrical arcing from the failed stator coil end turn to the stator cooling water system manifold. Further testing and inspections are planned to identify the cause of the failure and appropriate corrective actions. A supplemental report will be submitted following return of the generator to operation and completion of associated testing.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		0 5 0 0 0 4 9 8 9 0	- 0 2 5	- 0 0	0 2	OF

TEXT (if more space is required, use additional NRC Form 366A's) (7)

DESCRIPTION OF EVENT:

On November 24, 1990, Unit 1 was in Mode 1 at 100% power. At 1448 hours, the generator running ground fault relay actuated which initiated an automatic reactor trip. All systems responded as expected. The only abnormal conditions noted during the event were a rise in generator stator cooling water tank pressure and drop in generator hydrogen pressure. No Engineered Safety Features actuations occurred. The NRC was notified at 1735 hours.

Initial internal inspection of the generator revealed a damaged area at the end turn of bottom stator coil #20, at the turbine end, which is located between the nine and ten o'clock positions when viewed from the turbine end.

Investigation and recovery teams were formed to evaluate the failure and implement corrective actions. An inspection of the generator was performed. The following was observed:

- A significant amount of the stator coil cooling water inlet header box was missing, presumably vaporized or melted by electrical arcing.
- The teflon hose which connects the stator cooling water distribution header to the coil was damaged.
- The cooling water manifold nipple associated with the failed stator coil was eroded away from the inside, presumably by an electrical arc.
- There was no damage on the adjacent manifold nipples on either side of the eroded nipple.

The Westinghouse generator end turn construction is designed to rigidly connect all the end turns together to preclude excessive vibration of individual turns. During the week of November 26, 1990, Westinghouse personnel performed end turn impact tests on both Unit 1 and Unit 2 generators. The purpose of these impact tests was to determine the natural frequency of the generator end turn assembly with respect to the 120 Hz resonant frequency of each assembly. The general acceptance criteria for the impact test is an end turn natural resonance frequency above 130 Hz. The Unit 2 test was performed to determine the condition of that unit and also to provide a baseline for the Unit 1 test. The impact test results showed that the Unit 2 turbine end natural frequency was 135 Hz and the Unit 1 turbine end natural frequency was 110 Hz. Exciter end impact testing was not performed, since prior Westinghouse experience indicated that exciter end natural frequencies are substantially higher than turbine end natural frequencies. Westinghouse personnel interpreted the impact test results as being "excellent" for Unit 2 and "unacceptable" for Unit 1. The Unit 1 end turn

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LICENSE EVENT REPORT (LER) TEXT CONTINUATION

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
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TEXT (if more space is required, use additional NRC Form 306A's) (17)

DESCRIPTION OF EVENT: (cont'd)

resonance below 120 Hz suggests that the end turn assembly has already passed through the natural resonant frequency and has been subjected to vibration. This assumption is validated by the Unit 1 visual observations, which reveal significant end turn "dusting", "greasing", and broken blocking and lacing. These conditions are all confirmations of end turn vibration. By contrast, the Unit 2 visual observations reveal no signs of end turn vibration, as was confirmed by the impact testing.

CAUSE OF EVENT:

The ground fault relay actuation was due to electrical arcing from the stator coil end turn to the stator cooling water system manifold. testing and inspections are necessary before the cause of the failure can be conclusively determined.

ANALYSIS OF EVENT:

Unplanned reactor protection system actuation is reportable pursuant to 10CFR50.73(a)(2)(iv). The reactor tripped as required and plant equipment operated as expected. There was no safety injection actuation. There were no adverse radiological or safety consequences as a result of this event.

CORRECTIVE ACTION:

Additional testing and inspections are scheduled to determine if other latent damage exists in the generator. The generator will require extensive disassembly including removal of the rotor in order to effectively replace the failed stator coil. In addition, repair of the stator winding blocking and lacing is scheduled to raise the generator end turn natural frequency to an acceptable level.

Upon completion of the recovery effort and return of the generator to operation, a supplemental report will be issued. This report is currently scheduled to be completed by April 30, 1991.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) South Texas, Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 4 9 8 9 0	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
			0 2 5	0 0	0 4	OF 0 4

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

ADDITIONAL INFORMATION:

There have been no previous events at STPEGS regarding a stator coil end turn failure which resulted in a generator ground fault and subsequent reactor trip.

The generator is a 1500 MVA, 4 pole, 1800 RPM machine with water cooled stator and hydrogen cooled rotor manufactured by Westinghouse.

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