

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES 6/31/86

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

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

ADDITIONAL INFORMATION

Proposed revisions to the Palisades Technical Specifications are currently under review by the NRC. This informational LER fulfills the administrative requirement of submitting a special report in accordance with the proposed technical specification, Table 3.17.4, Item 22, dated September 2, 1988.

The Light company

Houston Lighting & Power

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

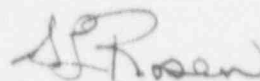
May 10, 1991
ST-HL-AE-3773
File No.: G26
10CFR50.73

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 91-012
Reactor Trip Due to Motor Generator Malfunction

Pursuant to 10CFR50.73, Houston Lighting & Power Company (HL&P) submits the attached Licensee Event Report (LER 91-012) regarding a reactor trip resulting from the loss of power to Reactor Trip Switchgear/Control Rod Drive Mechanisms.

If you should have any questions on this matter, please contact Mr. C. A. Ayala at (512) 972-8628 or myself at (512) 972-7138.



S. L. Rosen
Vice President,
Nuclear Engineering

GCS/sgs

Attachment: LER 91-012 (South Texas, Unit 1)

JE22 1/1

Houston Lighting & Power Company
South Texas Project Electric Generating Station

ST-HL-AE- 3773
File No.: G26
Page 2

cc:

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Revised 01/29/91

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 OF 0 4										PAGE (3) 1 OF 0 4																													
TITLE (4) Reactor Trip Due to Motor Generator Malfunction																																																	
EVENT DATE (5) MONTH DAY YEAR 0 4 1 2 9 1 9 1										LER NUMBER (6) SEQUENTIAL NUMBER 0 1 2										REPORT DATE (7) MONTH DAY YEAR 0 0 3 5 1 0 9 1										OTHER FACILITIES INVOLVED (8) FACILITY NAMES South Texas Unit 1 DOCKET NUMBER(S) 0 5 0 0 0 4 9 8																			
OPERATING MODE (9) 1										THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)																																							
POWER LEVEL (10) 0 4 0										20.402(b) 20.405(a)(1)(i) 20.405(a)(1)(ii) 20.405(a)(1)(iii) 20.405(a)(1)(iv) 20.405(a)(1)(v)										20.405(d) 50.36(a)(1) 50.36(a)(2) 50.73(a)(2)(i) 50.73(a)(2)(ii) 50.73(a)(2)(iii)										<input checked="" type="checkbox"/> 50.73(a)(2)(iv) 50.73(a)(2)(v) 50.73(a)(2)(vi) 50.73(a)(2)(vii)(A) 50.73(a)(2)(vii)(B) 50.73(a)(2)(ix)										73.71(b) 73.71(c) OT-xxx: Specify in Abstract Only: spec. in Text, NRC Form 366, 5/									
LICENSEE CONTACT FOR THIS LER (12) NAME Charles Ayala - Supervising Licensing Engineer TELEPHONE NUMBER AREA CODE 5 1 2 9 7 2 - 8 6 2 8																																																	
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																																																	
CAUSE										SYSTEM										COMPONENT										MANUFACTURER										REPORTABLE TO NRC									
SUPPLEMENTAL REPORT EXPECTED (14) <input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) 1 1 2 9 9 1 <input type="checkbox"/> NO																																																	
ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (15) On April 12, 1991, at 0418, the Unit 1 reactor tripped from 40% power. A turbine trip, feedwater isolation and auxiliary feedwater actuation occurred as a result of the reactor trip. Systems operated as designed in response to the reactor trip. It was determined that Rod Drive Motor Generator (RDMG) Set #11 tripped due to a transient induced by RDMG #12 which was found running with its motor and generator breakers closed with no output voltage to the Reactor Trip Switchgear. It is believed that intermittent pick-up and drop-out of the 2R relay, which actuates contacts to supply power to the RDMG Set #12's generator voltage regulator, caused instability in the voltage regulator operation. The 2R relay malfunction was due to a defective output switch. The instability of the voltage regulation resulted in transients that caused a reverse current to the RDMG Set #11 and a subsequent trip of the generator output breaker. It is also believed that the 2R relay contacts supplying power to the voltage regulator eventually remained open long enough to allow a loss of the generator field in the RDMG Set #12. A loss of the generator field results in zero output voltage from the generator. The loss of both of the power sources to the Reactor Trip Switchgear resulted in a reactor trip. The 2R relay's timer and control relay were replaced and a procedural change will be made to enhance the detection of relay timer malfunctions.																																																	

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
South Texas, Unit 1	0500049891	—	012	—	00	2	OF 04

TEXT (If more space is required, use additional NRC Form 388A's) (17)

DESCRIPTION OF EVENT:

On April 12, 1991, at 18 hours, the Unit 1 reactor tripped from 40% power. A turbine trip, feedwater isolation and auxiliary feedwater actuations occurred as a result of the reactor trip and all systems operated as designed. The "ROD DRIVE MG SET TROUBLE" annunciator came in several seconds prior to the reactor trip indicating a loss of one or both of the Rod Drive Motor Generator (RDMG) set power sources to the Reactor Trip Switchgear/Control Rod Drive Mechanisms. Upon further inspection by Plant Operations personnel, the RDMG Set #11 generator output breaker was found open due to phase-A directional overcurrent relay actuation and the RDMG Set #12 was running with its motor and generator breakers closed and no output voltage to the Reactor Trip Switchgear. Following the reactor trip, Plant Operations personnel stabilized Unit 1 at 0% reactor power with RCS pressure at 2235 psig and RCS temperature at 57°F (Mode 3, Hot Standby).

Further investigation by plant personnel revealed that, 1) the RDMG Set #12 generator voltage failed to hold and regulate after the generator's Field Flash pushbutton was pressed and, 2) the 2R (Regulator Power Relay) was chattering loudly when the Field Flash pushbutton was pressed. A work document was initiated to troubleshoot and investigate the problems noted in the RDMG Set #12. Also, a work document was initiated to troubleshoot the RDMG Set #11 to determine the cause of the phase-A directional overcurrent condition that tripped the MG set.

A calibration of the RDMG Set #11's IRV relay (directional overcurrent relay) was performed per procedure (Calibration of Westinghouse IRV Relay). This calibration found Minimum Pickup Test parameters for the IRV relay slightly above tolerance, but this out of tolerance was not the cause of the RDMG Set #11 trip.

In order to isolate the cause of the chattering observed in the 2R relay, the troubleshooting included continuity checks of the circuitry required for actuating the 2R relay contacts. The troubleshooting revealed that an electronic switch internal to the 2R relay timer was malfunctioning. Inconsistent voltage measurements across the electronic switch indicated that the electronic switch was erratic, causing the control voltage to the 2R relay to vary and the 2R relay to pick-up and drop-out erratically as well. The 2R relay controls contacts that supply power to the RDMG Set #12's generator voltage regulator and field. The 2R relay is composed of a Westinghouse type AR control relay and a Westinghouse type ART-OF solid state timer. The type ART-OF timer is mounted on the type AR control relay to provide timed operation of the AR relay. To verify that the switch was causing the malfunction, the timer was removed from the circuitry and a temporary manual

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		9 1	0 1 2	0 0	0	3 OF	0 4

NOTE: If more space is required, use additional NRC Form 365A's (17)

DESCRIPTION OF EVENT: (cont'd)

switch was jumpered across the electronic switch's terminal points on the 2R relay. With these jumpers in place the 2R relay operated satisfactorily and no relay chattering was observed. The 2R relay's timer and control relay were replaced with a new Westinghouse type ART-OF timer and type AR control relay. Post maintenance testing performed after the installation of the new timer and relay verified the RDMG sets to be operating satisfactorily in the single and parallel operation modes.

A review of the maintenance history since preventive maintenance was performed for the Unit 1 RDMG sets indicated previous problems with the 2R relay. On February 16, 1991, while performing the calibration of the timing relays during the refueling outage, the 1R timer (functionally identical timer to the 2R timer, but utilized in the RDMG Set #11) and the 2R timer setpoints were found to be out of tolerance. Electrical Maintenance personnel were unable to adjust the relays' setpoint within the acceptance criteria. The 1R/2R relay ART-OF timers were replaced on February 20, 1991 per the corrective actions specified. The type AR control relays were not replaced on the 1R or 2R relay. During the replacement of the relay timers, the 1R and 2R relays were calibrated to acceptable setpoint values.

On March 12, 1991, it was reported that the RDMG Set #12 was not maintaining a voltage after the Field Flash pushbutton was released and chattering was noted in the 2R relay. Additionally, it was reported that resistors R3 and R4 showed signs of overheating. Troubleshooting actions revealed errors in the wiring of the 2R relay. The wiring errors were corrected and the 2R relay's type AR control relay was replaced. There were no problems noted with the operation of relay's type ART-OF timer at this time, therefore, the timer installed per the actions noted in the preceding paragraph remained in service. It is not known what affects, if any, the miswiring of the relay may have had on the timer's electronic switch. Post maintenance testing involving the operation of the RDMG Set #12 was completed satisfactorily to verify the 2R relay's operability.

CAUSE OF EVENT

The new 2R timer installed on February 20, 1991 had a defective output switch. It is believed that intermittent pick-up and drop-out of the 2R relay, which actuates contacts to supply power to the RDMG Set #12's generator voltage regulator, caused instability of the voltage regulator operation. The instability of the voltage regulator resulted in transients that caused a reverse current to the RDMG Set #11 and a subsequent trip of the generator output breaker. It is also believed that the 2R relay contacts supplying the power to the voltage regulator, eventually remained open long enough to allow a loss of the generator field in the RDMG Set #12. A loss of the generator field results in zero output voltage from the generator. The loss of both of

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South Texas, Unit 1	0500049891	0	1	2	0	0	04 OF 04

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

CAUSE OF EVENT: (cont'd)

the power sources to the Reactor Trip Switchgear resulted in a reactor trip on negative reactivity rate.

ANALYSIS OF EVENT:

Unstable voltage regulation caused by the failure of the electronic switch internal to the 2R relay's timer resulted in transients that caused the loss of both power sources to the Reactor Trip Switchgear. The result of this failure was a reactor trip. Unplanned actuation of a Reactor Protection System is reportable pursuant to 10CFR50.73(a)(2)(iv). This event did not result in any increased risk to the safe operation of the plant. All safety systems functioned as required.

CORRECTIVE ACTIONS:

1. Troubleshooting (MWR 117861) revealed a failure of the 2R relay's solid state timer. The 2R relay's timer and control relay were replaced. Post maintenance testing verified that the RDMG sets were operating satisfactorily.
2. Procedural changes will be made to OPMP05-ZE-0047 (Calibration of Timing Relays) to include additional instructions for testing Westinghouse type ART-OF timers. This information will be beneficial in detecting relay timer malfunctions. The Maintenance Department will complete this action by September 1, 1991.
3. The investigation into the effects of the miswiring of the relay on the timer's electronic switch will continue and a supplement to this report will be provided by November of 1991.

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