May 29, 1997 ST-HL-AE-5650 File No.: G26 10CFR50.73 STI: 30279653

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

The Light

company

South Texas Project Unit 2 Docket No. STN 50-499 Licensee Event Report 97-006 Regarding a Manual Reactor Trip Due to Malfunctioning Main Feedwater Regulating Valve

Pursuant to 10CFR50.73, South Texas Project submits the attached Unit 2 Licensee Event Report 97-006 regarding a manual reactor trip due to a malfunctioning Main Feedwater Regulating Valve. 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.

JA Puluy for R. E. Masse

Plant Manager. Unit 2



Attachment: LER 97-006 (South Texas, Unit 2)

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VRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION (4-95)						APPROVED BY OMB NO. 3150-0104 EXPIRES 04/30/98								
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DESCRIPTION OF EVENT:

On April 30, 1997, Unit 2 was operating at 100% power in Mode 1. At approximately 2150 hours on April 30, 1997, feedwater flow oscillation to the 2D Steam Generator was observed. Manual control of the 2D Main Feedwater Regulating Valve was attempted and resulted in a zero feedwater demand signal with indication of decreasing feedwater flow to 2D Steam Generator. Attempts to manually increase or decrease the demand signal to 2D Main Feedwater Regulating Valve resulted in erratic behavior. With 2D Steam Generator level at 35% and decreasing, the reactor was manually tripped at 2158 hours on April 30, 1997. All control rods fully inserted. The Engineered Safeguards Features System actuated the Auxiliary Feedwater System and Feedwater Isolation as expected for a reactor up. All safety equipment operated as designed.

Troubleshooting determined that the 2D Main Feedwater Regulating Valve position followed controller demand. It was observed that with the 2D Main Feedwater Regulating Valve controller in manual and with a demand signal raised to 50%, the demand signal would continue to increase beyond the 50% signal although the manual control pushbutton had been released. The same anomalous controller behavior was observed with a decrease demand signal. These observations indicated the 2D Main Feedwater Regulating Valve Westinghouse 7300 Series controller-driver card malfunctioned.

A replacement controller-driver card was installed and the 2D Main Feedwater Regulating Valve controller responded as designed. Investigation determined that the malfunctioned controller-driver card had two failed integrated circuits in the counter and comparator portion of the control circuit causing the automatic mode failure of the 2D Main Feedwater Regulating Valve. It was also discovered that the malfunctioned controller-driver card had a hairline crack in the solder run leading to a resistor in the manual control circuit. This caused the manual mode failure of the 2D Main Feedwater Regulating Valve.

A review of the same type of 7300 Series controller-driver card used in other South Texas Project systems was conducted. This review concluded that a failure of the controller-driver card in these other systems would not lead to a reactor trip. A failure would result in a slowly developing transient that could be controlled by application of Off-Normal Operating Procedures or could be mitigated by redundant equipment.

Control circuits for South Texas Project Main Feedwater Regulating Valves are susceptible to single point failures. Approximately three years previous to this occurrence, preventive maintenance activities were initiated to detect impending card failures in the Main Feedwater Regulating Valve control circuits. South Texas Project plans to evaluate potential further enhancements to preventive maintenance activities using industry and site-specific data to improve card reliability. In addition, South Texas Project has performed a Main Feedwater Regulating Valve control circuit loop evaluation and is evaluating potential design changes to make the Main Feedwater Regulating Valve control circuit less susceptible to single point failures.

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CAUSE OF EVENT:

The cause of this occurrence was a failure of two integrated circuits in the 2D Main Feedwater Regulating Valve automatic control circuit and a hairline crack in the solder run leading to a resistor in the manual control circuit on the same controller card.

ANALYSIS OF EVENT:

Reactor Trips and Engineered Safeguards Features Actuations are reportable pursuant to 10CFR50.73(a)(2)(iv). The reactor was brought to an orderly shutdown. Engineered Safeguards Features functioned as designed. There were no adverse safety or radiological consequences of this event.

CORRECTIVE ACTION:

1. The 2D Main Feedwater Regulating Valve controller-driver card was replaced and the control circuit tested satisfactorily.

- 2. Alignment checks of the Main Feedwater Regulating Valve controller-driver cards in each Unit 2 train were performed satisfactorily prior to unit restart.
- 3. The Main Feedwater Regulating Valve controller-driver cards in each Unit 1 train will be replaced with newly aligned cards prior to the completion of the next Unit 1 refueling outage.

In addition to the above corrective actions, the following activities are being conducted to reduce the probability of a similar occurrence in the future:

- evaluation of potential further enhancements to preventive maintenance activities using industry and site-specific data to improve card reliability.

- evaluation of potential design changes to make the Main Feedwater Regulating Valve control circuit less susceptible to single point failures.

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ADDITIONAL, INFORMATION:

The failed circuit card is a Westinghouse 7300 controller-driver type NCD3.

A previous similar event described in Licensee Event Report 92-010 for Unit 2 resulted from the failure of a Westinghouse 7300 Series driver card. The power supply and the primary clock counter were determined to be the specific components whose failure led to the loss of card output.

Unit 1 Licensee Event Report 94-009 described a manual reactor trip due to a malfunctioning Main Feedwater Regulating Valve. A failed transformer coil in the torque motor in the current to pneumatic convertor caused a malfunction of the Main Feedwater Regulating Valve.