

# The Light company

Houston Lighting & Power

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

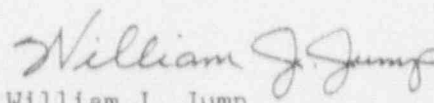
April 15, 1991  
ST-HL-AE-3748  
File No.: G26  
10CFR50.73

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

South Texas Project Electric Generating Station  
Unit 2  
Docket No. STN 50-499  
Licensee Event Report 91-003  
Regarding a Reactor Trip Caused By  
Actuation of a Generator Protective Relay

Pursuant to 10CFR50.73, Houston Lighting & Power Company (HL&P) submits the attached Licensee Event Report (LER 91-003) regarding a reactor trip caused by actuation of a generator protective relay. 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.

  
William J. Jump  
Manager,  
Nuclear Licensing

SMH/sgs

Attachment: LER 91-003 (South Texas, Unit 2)

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A Subsidiary of Houston Industries Incorporated

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Revised 01/29/91

## LICENSEE EVENT REPORT (LER)

|  |        |           |                |                   |                 |                  |                 |              |                   |   |   |  |     |      |   |   |  |  |  |                      |  |
|--|--------|-----------|----------------|-------------------|-----------------|------------------|-----------------|--------------|-------------------|---|---|--|-----|------|---|---|--|--|--|----------------------|--|
| FACILITY NAME (1)<br>South Texas, Unit 2   |        |           |                |                   |                 |                  |                 |              |                   | DOCKET NUMBER (2)<br>0 5 0 0 0 4 9 9 1 OF 0 3 |   |  |     |      |   |   |  |  |  | PAGE (3)<br>1 OF 0 3 |  |
| TITLE (4)<br>Reactor Trip Caused by Actuation of a Generator Protective Relay                                |        |           |                |                   |                 |                  |                 |              |                   |   |   |  |     |      |   |   |  |  |  |                      |  |
| 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(S)   |     |      |   |   |  |  |  |                      |  |
| 0  | 3      | 1         | 4              | 9                 | 1               | 9                | 1               | 0            | 0                 | 3   | 0 | 0  | 0   | 4    | 9 | 8 |  |  |  |                      |  |
| THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11) |        |           |                |                   |                 |                  |                 |              |                   |   |   |  |     |      |   |   |  |  |  |                      |  |
| OPERATING MODE (9)   |        | 1         |                | 20 402(b)         |                 | 20 405(e)        |                 | X            |                   | 50 73(a)(2)(iv)                               |   | 73.71(b)   |     |      |   |   |  |  |  |                      |  |
| POWER LEVEL (10)   |        | 1 0 0     |                | 20 405(a)(1)(i)   |                 | 50 38(a)(1)      |                 |              |                   | 50 73(a)(2)(iv)                               |   | 73.71(c)   |     |      |   |   |  |  |  |                      |  |
|  |        |           |                | 20 405(a)(1)(ii)  |                 | 50 38(a)(2)      |                 |              |                   | 50 73(a)(2)(vi)                               |   | OTHER (Specify in Abstract below and in Text, NRC Form 366A) |     |      |   |   |  |  |  |                      |  |
|  |        |           |                | 20 405(a)(1)(iii) |                 | 50 73(a)(2)(i)   |                 |              |                   | 50 73(a)(2)(vii)(A)                           |   |  |     |      |   |   |  |  |  |                      |  |
|  |        |           |                | 20 405(a)(1)(iv)  |                 | 50 73(a)(2)(ii)  |                 |              |                   | 50 73(a)(2)(vii)(B)                           |   |  |     |      |   |   |  |  |  |                      |  |
|  |        |           |                | 20 405(a)(1)(v)   |                 | 50 73(a)(2)(iii) |                 |              |                   | 50 73(a)(2)(ix)                               |   |  |     |      |   |   |  |  |  |                      |  |
| LICENSEE CONTACT FOR THIS LER (12)   |        |           |                |                   |                 |                  |                 |              |                   |   |   |  |     |      |   |   |  |  |  |                      |  |
| NAME<br>Charles Ayala - Supervising Licensing Engineer   |        |           |                |                   |                 |                  |                 |              |                   | TELEPHONE NUMBER<br>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 | CAUSE           | SYSTEM           | COMPONENT       | MANUFACTURER | REPORTABLE TO NRC |   |   |  |     |      |   |   |  |  |  |                      |  |
|  |        |           |                |                   |                 |                  |                 |              |                   |   |   |  |     |      |   |   |  |  |  |                      |  |
|  |        |           |                |                   |                 |                  |                 |              |                   |   |   |  |     |      |   |   |  |  |  |                      |  |
|  |        |           |                |                   |                 |                  |                 |              |                   |   |   |  |     |      |   |   |  |  |  |                      |  |
| 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 fifteen single-space typewritten lines) (16)

On March 14, 1991, Unit 2 was operating at 100% while Unit 1 was in Mode 5. At 1810 hours, Unit 1 Control Room personnel closed the switchyard breaker to energize the Unit 1 Main and Auxiliary Transformers. Immediately following this breaker closure, the Unit 2 B Phase Generator Isophase Bus differential relay actuated. This caused the generator lockout relay to actuate which resulted in a turbine trip and reactor trip. During the recovery process the Main Steam Isolation Valves (MSIV) were closed. A Steam Generator (SG) MSIV was subsequently reopened while a SG level was near the low-low setpoint and caused an Auxiliary Feedwater actuation. The protective relay actuation was caused by differences in the saturation rates of the two current transformers that supply the differential relay. The AFW actuation was caused by operating procedures that failed to provide guidance regarding minimum SG levels during MSIV manipulations. The corrective actions relative to the current transformers will be reported in LER 91-004, which describes a similar subsequent reactor trip event. Procedures will be revised and this event will be included in requalification training to minimize the potential for unnecessary AFW actuations.

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## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

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 2 | 0 5 0 0 0 4 9 9 9 1 | —              | 0 0 3             | —               | 0 0      | 0 2 OF 0 3 |  |

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

DESCRIPTION OF EVENT:

On March 14, 1991, Unit 2 was operating at 100% power, and Unit 1 was in Mode 5 at 400 psi and 100 degrees during a refueling outage. At 18:16:40, the Unit 1 Control Room closed switchyard breaker Y510 to energize the Unit 1 Main Station and Auxiliary Transformers. At 18:16:42, the B phase Unit 2 Generator Isophase Bus differential relay (87-1/G1) actuated. This, in turn, actuated the Generator Lockout relay (86/G1) which caused a turbine trip and reactor trip. Feedwater isolation occurred on low Reactor Coolant System average temperature, and Auxiliary Feedwater (AFW) actuated on low-low steam generator level as expected. During the recovery process, auxiliary feedwater flow was manually isolated and main feedwater flow restored. To control the cooldown rate, the Main Steam Isolation Valves were manually closed. Subsequently, the steam pressure on the steam line header was equalized and MSIV 2A was opened at 1936. Immediately following the opening of MSIV 2A a second AFW actuation was received. All equipment functioned as expected.

The 87-1/G1 relay, which actuated during this event, received sensor inputs from a Current Transformer (CT) located in the neutral of the Main Generator and from a CT located on the Main Station Transformer (MST) side of the Generator Circuit Breaker (GCB). This relay, in turn, actuated the 86/G1 relay, tripping the Main Generator and Turbine.

Following the event, troubleshooting and fault recording analysis established that no actual fault occurred. Subsequent testing revealed that the current transformers associated with relay 87-1/G1 saturate at different rates, causing the relay to see a current differential across the generator when switchyard circuit breakers are closed.

At the time MSIV 2A was opened, SG 2A level was approximately 38%. Opening of the MSIV caused a swell and subsequent shrink in the SG to a point below the SG low-low setpoint (33%) and resulted in reactivation of AFW. It was determined that operating procedures did not provide guidance on the potential impact of opening an MSIV when SG water levels are near the low-low setpoint.

CAUSE OF EVENT:

Actuation of relay 87-1/G1 and subsequent Main Generator Lockout was caused by a difference in the saturation rates of the CTs associated with relay 87-1/G1. Reactivation of the AFW system was caused by opening an MSIV while the SG water level was near the low-low setpoint. Procedures used during this evolution did not clearly indicate the potential for AFW reactivation to occur under these circumstances.

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## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (3)

PAGE (3)

South Texas, Unit 2

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TEXT (If more space is required, use additional NRC Form 365A 2/ (17))

ANALYSIS OF EVENT:

Lockout of the Main Generator resulted in a Turbine trip and Reactor trip. During the restoration process following the trip, a second inadvertent actuation of the AFW system occurred. Automatic actuation of an Engineered Safety Feature or the 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 designed.

CORRECTIVE ACTIONS:

The following corrective actions have been taken as a result of this event:

- 1) Evaluation of test data collected for relay 87-1/G1 and the associated current transformer continues. As indicated in the Additional Information section of this LER, a second Unit 2 Main Generator Lockout and subsequent reactor trip occurred on March 30, 1991. The LER associated with that event (LER 91-004) will describe the corrective actions to be taken relative to the current transformers.
- 2) Temporary modifications have been implemented in both Units to remove the trip capability of relay 87-1/G1. Redundant protection is provided by other protective relays.
- 3) Appropriate operating procedures will be revised by July 31, 1991 to provide guidance on the potential for an AFW actuation while performing manipulations that may lower SG levels below the SG low-low setpoint. As an interim measure, a training bulletin has been issued to the plant operating staff emphasizing the potential for AFW actuation during low SG water level conditions.
- 4) This event will be incorporated into the licensed operator requalification training program by August 23, 1991 to reemphasize the potential for an ESF actuation while opening the MSIVs near the SG low-low level setpoint.

ADDITIONAL INFORMATION:

On March 30, 1991, a second Main Generator Lockout trip occurred, initiated from the B phase 87-1/G1 differential circuit. This event will be described in LER 91-004 to be submitted by April 29, 1991.

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