

# The Light company

Houston Lighting & Power

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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

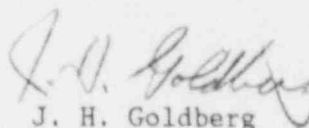
Response to NRC Compliance Bulletin 88-002:

"Rapidly Propagating Fatigue Cracks in Steam Generator Tubes"

Houston Lighting & Power Company (HL&P) has evaluated the subject bulletin received on February 10, 1988, and submits the attached response to the actions the bulletin requests. It is HL&P's understanding that this bulletin does not apply to STP Unit 2 Steam Generators which are equipped with stainless steel tube support plates.

As stated in the attachment, a supplemental report will be submitted on or before January 1, 1989.

If you should have any questions on this matter, please contact Mr. S. M. Head at (512) 972-8392.



J. H. Goldberg  
Group Vice President, Nuclear

JHG/SMH/jks

Attachment: Response to NRC Compliance  
Bulletin 88-002

L3/A: GQ/NRC

A Subsidiary of Houston Industries Incorporated

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter

Houston Lighting & Power  
Company, et al.,

South Texas Project  
Unit 1

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Docket No. 50-498

AFFIDAVIT

J. H. Goldberg being duly sworn, hereby deposes and says that he is Group Vice President, Nuclear of Houston Lighting & Power Company; that he is duly authorized to sign and file with the Nuclear Regulatory Commission the attached response to NRC Bulletin 88-002; is familiar with the content thereof; and that the matters set forth therein are true and correct to the best of his knowledge and belief.

*J. H. Goldberg*

J. H. Goldberg  
Group Vice President, Nuclear

STATE OF TEXAS

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Subscribed and sworn to before me, a Notary Public in and for the State of Texas this 28<sup>th</sup> day of MARCH, 1988.



*Angelina K. Self*  
Notary Public in and for the  
State of Texas

cc:

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Attachment 1  
Response to NRC Compliance Bulletin 88-002

NRC Specified Action A:

"The most recent steam generator inspection data should be reviewed for evidence of denting at the uppermost tube support plate. Inspection records may be considered adequate for this purpose if at least 3% of the total steam generator tube population was inspected at the uppermost support plate elevation during the last 40 calendar months. "Denting" should be considered to include evidence of upper support plate corrosion and the presence of magnetite in the tube-to-support plate crevices, regardless of whether there is detectable distortion of the tubes. The results of this review shall be included as part of the 45-day report. Where inspection records are not adequate for this purpose, inspections of at least 3% of the total steam generator tube population at the uppermost support plate elevation should be performed at the next refueling outage. The schedule for these inspections shall be included as part of the 45-day report and the results of the inspections shall be submitted within 45-days of their completion. Pending completion of these inspections, an enhanced primary-to-secondary leak rate monitoring program should be implemented in accordance with paragraph C.1."

Project Response

Since Unit 1 of the South Texas Project Electric Generating Station (STPEGS) had not yet operated except during low power and preoperational startup testing, Houston Lighting & Power Company (HL&P) does not believe environmentally induced denting has occurred. HL&P has performed eddy current baseline testing encompassing one hundred percent (100%) of the Unit 1 steam generators' (SGs) tubes. This testing was completed in November 1985. The data from this testing indicates some internal diameter profile distortions near the tube support plates, but the identified internal distortions occurred as a result of pre-operational activities (fabrication, transport, and/or construction). Conditions necessary for the formation of fast linear growth magnetite (high temperature operations with faulted chemistry) had not been experienced at STPEGS prior to November 1985.

HL&P does not plan to implement an enhanced primary-to-secondary (PTS) leakage rate monitoring program at this time.

NRC Specified Action B:

"For plants where no denting is found at the uppermost support plate, the results of future steam generator tube inspections should be reviewed for evidence of denting at the uppermost support plate. If denting is found in the future, the provisions of item C below should be implemented. Commitments to implement these actions shall be submitted when the results as A above are submitted."

Project Response:

Indications of internal diameter profile distortions detected as part of each inservice inspection of SG tubes will be recorded. A minimum of three percent (3%) of the tubes will be inspected at the first inservice inspection per the STPEGS Technical Specifications. Internal diameter profile distortions which were not detected during the baseline examinations will require examination for magnetite accumulation in the upper support plate area of SG tubes susceptible to fatigue cracking. This examination of the susceptible tubes will occur during each regularly scheduled SG tube inservice inspection.

NRC Specified Action C:

"For plants where denting is found, the NRC staff requests that the following actions be taken:

1. Pending completion of the NRC staff review and approval of the program described in C.2 below or completion of inspections specified in item A above to confirm that denting does not exist, an enhanced primary-to-secondary leak rate monitoring program should be implemented as an interim compensatory measure within 45-days of the date of receipt of this bulletin. Implementation of this program shall be documented as part of the 45-day report. The enhanced monitoring program is intended to ensure that if a rapidly propagating fatigue crack occurs under flow-induced vibration, the plant power level would be reduced to 50% power or less at least 5 hours before a tube rupture was predicted to occur.

This program should consider and provide the necessary leakage measurement and trending methods, time intervals between measurements, alarms and alarm setpoints, intermediate actions based on leak rates or receipt of alarms, administrative limits for commencing plant shutdown, and time limitations for (1) reducing power to less than 50% and (2) shutting down to cold shutdown. Appropriate allowances for instrument errors should be considered. Finally, the program should make provision for out of service radiation monitors, including action statements and compensatory measures.

2. A program should be implemented to minimize the probability of a rapidly propagating fatigue failure such as occurred at North Anna Unit 1. The need for long-term corrective actions (e.g., preventive plugging and stabilization of potentially susceptible tubes, hardware, and/or operational changes to reduce stability ratios) and/or long-term compensatory Measures (e.g., enhanced leak rate monitoring program) should be assessed and implemented as necessary. An appropriate program would include detailed analyses, as described in subparagraphs (a) and (b) below, to assess the potential for such a failure. Alternative approaches and/or compensatory measures implemented in lieu of the actions in subparagraphs (a) or (b) below should be justified.

Although the 45-day report shall provide a clear indication of actions proposed by licensees, including their status and schedule, a detailed description of this program and the results of analyses shall be submitted subsequently, but early enough to permit NRC staff review and approval prior to the next scheduled restart from a refueling outage. Where the next such restart is scheduled to take place within 90 days, staff review and approval will not be necessary prior to restart from the current refueling outage. An acceptable schedule for for submittal of the above information should be arranged with the NRC plant project manager by all licensees to ensure that the staff will have adequate time and resources to complete its review without adverse impact on the licensee's schedule for restart.

- (a) The analysis would include an assessment of stability ratios (including flow peaking effects) for the most limiting tube locations to assess the potential for rapidly propagating fatigue cracks. This assessment would be conducted such that the stability ratios are directly comparable to that for the tube which ruptured at North Anna.
- (b) The analysis would include an assessment of depth of penetration of each anti-vibration bar (AVB). The purpose of this assessment is twofold: (1) to establish which tubes are not effectively supported by AVBs and (2) to permit an assessment of flow peaking factors.

(Note: Most steam generators have at least two sets of AVBs. This applies only to the set that penetrates most deeply into the tube bundle.) The methodology used to determine the depth of penetration of each individual AVB shall be described in detail in the written report. The criteria for determining whether a tube is effectively supported by an AVB shall also be identified. (Note: An AVB that penetrates far enough to produce an eddy current signal in given tube may not penetrate far enough to provide a fully effective lateral support to that tube.)

#### Project Response:

Given the operating history and baseline NDE data of the Unit 1 SGs, HL&P does not believe that an enhanced PTS leakage rate monitoring program is necessary at this time. Should future inspections identify denting in the presence of linear growth magnetite at susceptible tubes, the tube will be either plugged or HL&P will implement a PTS leakage rate monitoring program that meets the intent of Action C.1.

In addition, a review of the baseline eddy current testing data will be performed to establish the depth of penetration of the SG anti-vibration bars to determine the effective lateral tube support. An assessment will also be made of the fluid-elastic stability ratios (including flow peaking effects) for the most limiting tube locations.

A supplemental report detailing the results of the baseline data review and the fluid elastic stability ratio assessment will be submitted on or before January 1, 1989.