DOCKET FILE

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

September 17, 1990

Docket Nos. 50-498
and 50-499

Mr. Donald P. Hall
Group Vice-President, Nuclear
Houston Lighting & Power Company
P.O. Box 1700
Houston, Texas 77251

Dear Mr. Hall:

SUBJECT: NRC BULLETIN 88-11, "PRESSURIZER SURGE LINE THERMAL STRATIFICATION" - SOUTH TEXAS PROJECT, UNITS 1 AND 2 (TAC NO. 72168)

By letter dated March 14, 1989 (ST-HL-AE-3016) Houston Lighting & Power Company (HL&P) responded to the subject bulletin. The response stated that the actions requested in Item 1.b of the bulletin are complete and that the staff reported the results of the review in Supplements 6 and 7 to NUREG-0781.

In Supplement 7 to NUREG-0781 and in the staff's safety evaluation dated October 19, 1989, the staff stated:

> "On the basis of the review and inspection, the staff concludes that HL&P has made acceptable efforts to meet Action Items 1.a and 1.b as delineated in NRC Bulletin 88-11. The efforts demonstrate that, on the basis of the available stratification data, the surge line meets the applicable design codes. Pipe movements of the pressurizer surge line also will be reviewed and verified during the next plant heatup, scheduled to be part of the bottom-mounted instrument inspection outage, to ensure that clearances have been considered. Additionally, HL&P will verify the stress and fatigue analyses to ensure compliance with the ASME Code when the plant-specific data from the Unit 1 monitoring program are completed during its first refueling outage."

In its letter of January 26, 1990 (ST-HL-AE-3284), HL&P stated that review of the Unit 1 monitoring data through the October 1989 heatup [startup from the first refueling outage] has been performed. Based on the review, HL&P concluded that the pressurizer surge line transients defined in WCAP-12067 are conservative and are considered to bound the monitoring data. HL&P further stated that, with the exception of one heatup cycle, the cases of stratification observed were determined to be within the analytical bounds of WCAP-12067, Rev. 1. The exception was one heatup during which the system

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temperature difference was observed to be outside the bounds of WCAP-12067, Rev. 1 (i.e. exceeded 320°F). HL&P revised the operating procedures to prevent recurrence of the condition. The staff finds this acceptable. Accordingly, the staff concludes that your responses have addressed the issues in the bulletin and we are closing the subject TAC. Further NRC review, if any, will be by future inspections or audits.

If you have any questions concerning the staff's position, contact me at (301) 492-1309.

Sincerely,

Original Signed By:

George F. Dick, Jr., Project Manager
Project Directorate IV-2
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Reaction

cc: See next page

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March 14, 1989
ST-HL-AE-3016
File No.: G3.03
10CFR50

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

South Texas Project Electric Generating Station
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Response to NRC Bulletin 88-11
"Pressurizer Surge Line Thermal Stratification"

Reference: 1. ST-HL-AE-2900 dated December 9, 1988
2. ST-HL-AE-2949 dated January 17, 1989
3. ST-HL-AE-2973 dated February 1, 1989
4. ST-HL-AE-2992 dated February 15, 1989

Houston Lighting & Power Company (HL&P) has evaluated the subject bulletin, and submits the attached response for Units 1 and 2 of the South Texas Project Electric Generating Station. Actions requested in Item 1.b. of the bulletin are complete and have been reviewed by the staff in the preparation of supplements 6 and 7 to the STP Safety Evaluation Report (NUREG 0781). WCAP 12067, Rev. 1 and its supplement provide the basis for the 40 year qualification of the STP surge line. The development and conclusion of the WCAP are briefly described below.

WCAP 12067, Rev. 0 (Ref. 1) provided analyses of the effects of thermal stratification on the pressurizer surge line and residual heat removal (RHR) line as presented to the staff on November 30, 1988. (The RHR line analysis was later resubmitted separately as WCAP 12108.) The supplement (Ref. 2) to WCAP 12067, Rev. 0 was submitted in response to NRC comments in Supplement 6 to the STP SER, and the WCAP was revised to include the supplement and other explanatory information (Ref. 3). Meetings in Pittsburgh and at STP January 30-February 2, 1989 concerning the staff review of the WCAP culminated in the submittal of supplement 1 to WCAP 12067, Rev. 1 (Ref 4).

The work presented in the WCAP and its supplement leads to the following conclusions:

(a) Based on plant monitoring results from Westinghouse PWR's (including South Texas Unit 1) and flow stratification test data, the thermal design transients for the surge line have been updated to incorporate the effects of stratification, and thermal striping.

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(b) The global structural and local stresses and loads in the surge line piping and support system meet ASME III code allowables. The maximum cumulative fatigue usage factor for 40 year design life is less than the allowable of 1.0, including the effects of thermal striping.

(c) Fatigue crack growth (FCG) analyses show that a postulated 10% initial crack will not propagate beyond 60% of the pipe wall in 40 years design life.

(d) Leak-before-break is confirmed for all loading combinations, including maximum postulated stratification, using the methods of SRP 3.6.3 and NUREG 1061, consistent with previously submitted reports WCAP-10489 and WCAP-11256.

HL&P will continue to monitor the Unit 1 pressurizer surge line until the first refueling outage. A final report will then be prepared which will make use of STP and other available industry data, and is expected to confirm the conservatism of the analyses of thermal stratification of the pressurizer surge lines.

If you should have any questions on this matter, please contact Mr. M. A. McBurnett (512) 972-8530.

S. L. Rosen
Vice President,
Nuclear Engineering
and Construction

SLR/RAH/hg

Attachment: Response to NRC Bulletin 88-11.

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Revised 12/21/88

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter	)	
	)	
Houston Lighting & Power Company, et al.,	)	Docket Nos. 50-498 50-499
	)	
South Texas Project Units 1 and 2	)	

AFFIDAVIT

S.L. Rosen, being duly sworn, hereby deposes and says that he is Vice President, Nuclear Engineering and Construction 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 88-11; 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.

S. L. Rosen
Vice President
Nuclear Engineering
and Construction

STATE OF TEXAS)
)
)

Subscribed and sworn to before me, a Notary Public in and for the State of Texas this 14 day of March, 1989.

JEANNIE SHOCK
Notary Public, State of Texas
My Commission Expires 9-22-92

Notary Public in and for the
State of Texas

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NRC Bulletin 88-11
"Pressurizer Surge Line Thermal Stratification"

Action Item

Addresses are requested to take the following actions:

1. For all licensees of operating PWRs:

   a. Licensees are requested to conduct a visual inspection (ASME, Section XI, VT-3) of the pressurizer surge line at the first available cold shutdown after receipt of this bulletin which exceeds seven days. This inspection should determine any gross discernible distress or structural damage in the entire pressurizer surge line, including piping, pipe supports, pipe whip restraints, and anchor bolts.

   b. Within four months of receipt of this Bulletin, licensees of plants in operation over 10 years (i.e., low power license prior to January 1, 1979) are requested to demonstrate that the pressurizer surge line meets the applicable design codes* and other FSAR and regulatory commitments for the licensed life of the plant, considering the phenomenon of thermal stratification and thermal striping in the fatigue and stress evaluations. This may be accomplished by performing a plant specific or generic bounding analysis. If the latter option is selected, licensees should demonstrate applicability of the referenced generic bounding analysis. Licensees of plants in operation less than ten years (i.e., low power license after January 1, 1979), should complete the foregoing analysis within one year of receipt of this bulletin. Since any piping distress observed by addressees in performing action 1.a may affect the analysis, the licensee should verify that the bounding analysis remains valid. If the opportunity to perform the visual inspection in 1.a does not occur within the periods specified in this requested item, incorporation of the results of the visual inspection into the analysis should be performed in a supplemental analysis as appropriate.

* Fatigue analysis should be performed in accordance with the latest ASME Section III requirements incorporating high cycle fatigue.

NRC Bulletin 88-11
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Action Item (cont.)

Where the analysis shows that the surge line does not meet the requirements and licensing commitments stated above for the duration of the license, the licensee should submit a justification for continued operation or bring the plant to cold shutdown, as appropriate, and implement Items 1.c and 1.d below to develop a detailed analysis of the surge line.

c. If the analysis in 1.b does not show compliance with the requirements and licensing commitments stated therein for the duration of the operating license, the licensee is requested to obtain plant specific data on thermal stratification, thermal striping, and line deflections. The licensee may choose, for example, either to install instruments on the surge line to detect temperature distribution and thermal movements or to obtain data through collective efforts, such as from other plants with a similar surge line design. If the latter option is selected, the licensee should demonstrate similarity in geometry and operation.

d. Based on the applicable plant specific or referenced data, licensees are requested to update their stress and fatigue analyses to ensure compliance with applicable Code requirements, incorporating any observations from 1.a above. The analysis should be completed no later than two years after receipt of this bulletin. If a licensee is unable to show compliance with the applicable design codes and other FSAR and regulatory commitments, the licensee is requested to submit a justification for continued operation and a description of the proposed corrective actions for effecting long term resolution.

Response

The performance of visual inspections (ASME, Section XI, VT-3) of the STP Unit 1 and Unit 2 pressurizer surge lines was reported in Reference 4. No apparent distress or structural damage was found.

The analysis has been performed (Westinghouse WCAP-12067 and Bechtel calculation # RC-9599) to demonstrate that the STP pressurizer surge line meets the applicable design codes and other FSAR and regulatory requirements for the licensed life of the plant. WCAP 12067, through Supplement 1 to Revision 1, was submitted to NRC for their review (Reference 1,2,3,4). The analysis envelopes data from five operating units including limited data from STP Unit 1.

Although the analysis mentioned above does show compliance with the requirements and licensing commitments stated therein for the duration of the operating license, the STP Unit 1 pressurizer surge line is being monitored for temperature and displacement. This monitoring is expected to continue through the Unit 1 cooldown for its first refueling outage.

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"Pressurizer Surge Line Thermal Stratification"

Response (cont.)

Plant specific data and other available industry data will then be reviewed to assure that the cycles and the stratification temperatures as assumed in the analysis are conservative. If required, the stress analysis will be updated to meet the applicable code requirements. The results will be documented in a final report. The Unit 1 and Unit 2 pressurizer surge lines are identical, therefore Unit 1 plant monitored stratification data will be used for both units.

Action Item

2. For all applicants for PWR Operating Licenses:

   a. Before issuance of the low power license, applicants are requested to demonstrate that the pressurizer surge line meets the applicable design codes and other FSAR and regulatory commitments for the licensed life of the plant. This may be accomplished by performing a plant-specific or generic bounding analysis. The analysis should include consideration of thermal stratification and thermal striping to ensure that fatigue and stress are in compliance with applicable code limits. The analysis and hot functional testing should verify that piping thermal deflections result in no adverse consequences, such as contacting the pipe whip restraints. If analysis or test results show Code noncompliance, conduct of all actions specified below is requested.

   b. Applicants are requested to evaluate operational alternatives or piping modifications needed to reduce fatigue and stresses to acceptable levels.

   c. Applicants are requested to either monitor the surge line for effects of thermal stratification, beginning with hot functional testing, or obtain data through collective efforts to assess the extent of thermal stratification, thermal striping and piping deflections.

   d. Applicants are requested to update stress and fatigue analyses, as necessary, to ensure Code compliance.* The analyses should be completed no later than one year after issuance of the low power license.

Response

Items 2.a, 2.b, 2.c, and 2.d of the Bulletin only apply to applicants for PWR Operating Licenses.

* If compliance with the applicable codes is not demonstrated for the full duration of an operating license, the staff may impose a license condition such that normal operation is restricted to the duration that compliance is actually demonstrated.

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NRC Bulletin 88-11
"Pressurizer Surge Line Thermal Stratification"

Action Item

3. Addressees are requested to generate records to document the development and implementation of the program requested by Items 1 or 2, as well as any subsequent corrective actions, and maintain these records in accordance with 10 CFR Part 50, Appendix B and plant procedures.

Response

The STP analyses have been performed and maintained in accordance with 10CFR50, Appendix B and plant procedures.

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