October 23, 1995

Mr. William T. Cottle
Group Vice-President, Nuclear
Houston Lighting & Power Company
South Texas Project Electric
Generating Station
P. O. Box 289
Wadsworth, TX 77483

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING GENERIC LETTER (GL) 92-08, "THERMO-LAG 330-1 FIRE BARRIERS," SOUTH TEXAS PROJECT, UNITS 1 AND 2 (TAC NOS. M85606 AND M85607)

Dear Mr. Cottle:

The NRC staff has reviewed Houston Lighting & Power Company's (HL&P's) responses of December 19, 1994, March 28, and April 24, 1995, to the staff's RAIs of September 19, December 29, 1994, and March 1, 1995, respectively. HL&P was required, pursuant to Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f), to submit written reports, under oath or affirmation, that contained the information specified in the RAIs.

Based on its review, the staff has determined that the responses are incomplete from an ampacity derating standpoint. The specific areas where the responses are incomplete are discussed in the enclosure. It is requested that you submit a revised response that addresses the areas discussed in the enclosure, within 60 days from the date of this letter.

The reporting requirements contained in this letter affect fewer than ten respondents; therefore, OMB clearance is not required under Public Law 96-511.

Sincerely,

Original Signed By:

Thomas W. Alexion, Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket Nos. 50-498 and 50-499

Enclosure: Request for Additional Information

cc w/encl: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 23, 1995

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Group Vice-President, Nuclear
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Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket Nos. 50-498 and 50-499

Enclosure: Request for Additional Information

cc w/encl: See next page

cc:

Mr. David P. Loveless
Senior Resident Inspector
U.S. Nuclear Regulatory Commission
P. O. Box 910
Bay City, TX 77414

Mr. J. C. Lanier/M. B. Lee
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

Mr. K. J. Fiedler
Mr. M. T. Hardt
Central Public Service Board
P. O. Box 1771
San Antonio, TX 78296

Mr. C. A. Johnson
Central Power and Light Company
P. O. Box 289
Mail Code: N5012
Wadsworth, TX 74483

INPO
Records Center
700 Galleria Parkway
Atlanta, GA 30339-3064

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

Mr. Joseph M. Hendrie
50 Bellport Lane
Bellport, NY 11713

Judge, Matagorda County
Matagorda County Courthouse
1700 Seventh Street
Bay City, TX 77414

Mr. Lawrence E. Martin
General Manager, Nuclear Assurance Licensing
Houston Lighting and Power Company
P. O. Box 289
Wadsworth, TX 77483

Jack R. Newman, Esq.
Morgan, Lewis & Bockius
1800 M Street, N.W.
Washington, DC 20036-5869

Licensing Representative
Houston Lighting and Power Company
Suite 610
Three Metro Center
Bethesda, MD 20814

Rufus S. Scott
Associate General Counsel
Houston Lighting and Power Company
P. O. Box 61867
Houston, TX 77208

Joseph R. Egan, Esq.
Egan & Associates, P.C.
2300 N Street, N.W.
Washington, DC 20037

Office of the Governor
ATTN: Andy Barrett, Director
Environmental Policy
P. O. Box 12428
Austin, TX 78711

Arthur C. Tate, Director
Division of Compliance & Inspection
Bureau of Radiation Control
Texas Department of Health
1100 West 49th Street
Austin, TX 78756

J. W. Beck
Little Harbor Consultants, Inc.
44 Nichols Road
Cohasset, MA 02025-1166

SOUTH TEXAS PROJECT, UNITS 1 AND 2
DOCKET NOS. 50-498 AND 50-499
FOLLOWUP REQUEST FOR ADDITIONAL INFORMATION REGARDING
GENERIC LETTER 92-08
"THERMO-LAG 330-1 FIRE BARRIERS"

Sections 1.0 and 2.0 contain background information. Section 3.0 contains the followup request for additional information.

1.0 REQUEST FOR ADDITIONAL INFORMATION (RAI) OF SEPTEMBER 19, 1994

In the RAI of September 19, 1994, the NRC staff requested information regarding important barrier parameters, Thermo-Lag barriers outside the scope of the Nuclear Energy Institute (NEI) program, ampacity derating, alternatives, and schedules.

In its submittal of December 19, 1994, the licensee indicated that site-specific ampacity derating tests had been conducted by the Underwriters Laboratories (UL) Inc. for the South Texas Project. The licensee considered the subject test results directly applicable to the plant design. In addition, the licensee stated that they would respond in further detail when the technical issues with respect to ampacity derating factors have been resolved.

During a public meeting on March 14, 1995, with the licensees for the four lead plants for the resolution of Thermo-Lag issues, the staff responded to the question, "Will the resolution of the ampacity derating concern be deferred until agreement is reached on the appropriate testing protocol (i.e., IEEE P848)?" The staff reiterated its position, which was previously stated in the September 1994 RAI, that the ampacity derating concern could be resolved independently of the fire endurance concerns. After a review of the tests performed under the draft Institute of Electrical and Electronic Engineers (IEEE) Standard P848, the staff transmitted comments that were designed to ensure the repeatability of test results to the IEEE working group responsible for the test procedure.

On May 18, 1995, members of the NRC staff held a telephone conference call with NEI representatives concerning ampacity derating issues for Thermo-Lag fire barriers. The staff indicated that the latest IEEE P848 draft procedure can be used by licensees or NEI as the basis for an ampacity derating test program. NEI agreed to review the Comanche Peak Steam Electric Station Unit 2 Safety Evaluation (SE) in order to develop a generic test program. The memorandum dated May 22, 1995, which documents the subject telephone conference meeting, is attached for your information (Attachment 1). In addition, a copy of the subject SE dated June 14, 1995, was sent to those licensees who rely on Thermo-Lag installations.

2.0 REQUEST FOR ADDITIONAL INFORMATION OF DECEMBER 29, 1994

In the RAI of December 29, 1994, the staff requested information describing the examinations and inspections that will be performed to obtain the important barrier parameters for the Thermo-Lag configurations installed at the South Texas Project. In its response of March 28, 1995, the licensee did not provide any further information in the ampacity derating area.

3.0 REQUEST FOR ADDITIONAL INFORMATION OF MARCH 1, 1995

In the RAI of March 1, 1995, the staff requested that the licensee submit the applicable UL test reports being used to demonstrate the validity of the existing ampacity derating parameters as well as any other documents which support these determinations.

In its submittal of April 24, 1995, the licensee provided the subject test report. After a review of the subject UL report identified as Project 86NK23826, File R6802, entitled "Special Services Investigation of Ampacity Ratings For Power Cables in Steel Conduits and In Open-Ladder Cable trays With Field Applied Enclosures," the licensee is requested to address the following concerns and questions regarding the applicability of those test results for the South Texas Project (STP), Units 1 and 2:

1. In Attachment 1 of the subject licensee submittal entitled "Ampacity Testing in UL," Bechtel Log No. 14926-C042-00017-B3M, there are comments (pages 8 and 9 of Attachment 1) on the deviations from the specification requirements that were noted in the subject UL report. Specifically, Comment 6 reads "Spec. Para 5.4.3 - Linear regression analysis is not used for conductor temperature measurements as specified because of the close tolerances achieved in maintaining the steady state temperature of conductor at 90°C." This statement appears to be inconsistent with the stated purpose of the ampacity test (i.e., maintain a steady state temperature while measuring the current).

   The linear regression method allows several thermocouple readings to be averaged over time in order to determine the slope or rate of temperature change. A small slope value (for example, IEEE P848 specifies) denotes the desired thermal equilibrium condition for the current measurement.

2. The subject UL report provides an ampacity value (i.e. 34.8 amperes) for the conduit with the ½-inch Thermo-Lag fire barrier which is higher than the ampacity value reported for the baseline conduit (i.e. 34.1 amperes). Please provide a technical basis for this discrepancy.

3. Please identify any deviations in the construction of Thermo-Lag installations at STP with respect to the tested UL configurations. An evaluation should analyze any deviations of the installed configuration with respect to the test configuration for potential impact on the applicability of the subject test results.

4. During the course of the investigation into Thermal Sciences Inc. (TSI) Thermo-Lag fire barrier issues, the staff received a UL letter dated December 30, 1986, to TSI, which put into question the validity of the test results associated with the subject UL report. The subject UL test report documents an ampacity test conducted on October 11, 1986. The subject UL letter described a duplicate ampacity test completed on October 25, 1986, which was conducted by UL personnel independent of the Bechtel and TSI representatives. A significant difference between the two tests were the longer time period (15 minutes versus 4 hours) used to establish thermal equilibrium in the October 25, 1986, test. Please comment on the following technical issues raised in the attached December 30, 1986, UL letter (Attachment 2) to TSI:

   (a) The observation made by the UL Senior Engineering Associate that the TSI panels provided for both tests were uncured and the test specimens were not representative of installed field conditions.

   (b) The adequacy of the stabilization time (i.e., 15 minutes) used by Bechtel and TSI personnel as documented in UL Report Project 86NK23826, File R6802.

May 22, 1995

NOTE TO: Brian W. Sheron, Director, DE, NRR

FROM: Carl H. Berlinger, Chief, EELB, DE, NRR

SUBJECT: MEMORANDUM OF RECORD

On May 18, 1995, members of the NRC staff (B. Sheron, C. Berlinger, P. Gill, M. Gamberoni and R. Jenkins) held a telephone conference call with Mr. Alex Marion and Mr. Biff Bradley of the Nuclear Energy Institute (NEI) on ampacity derating issues for Thermo-Lag fire barriers. Mr. Marion contacted the staff regarding two topics: (1) Status of the Safety Evaluation (SE) on the Comanche Peak Steam Electric Station (CPSES), Unit 2 Ampacity Derating Test Program; and (2) Staff Acceptance of the IEEE Standard P848, "Procedure for the Determination of the Ampacity Derating of Fire Protected Cables."

Dr. Berlinger stated that the subject SE for CPSES 2 had been completed and we expected that it will be transmitted to the licensee within the next two weeks. Dr. Berlinger agreed to notify Mr. Marion by phone after the SE had been issued by the staff. Due to potential generic applications the staff will provide a copy of the CPSES, Unit 2 SE to licensees with Thermo-Lag fire barriers.

The staff has been interfacing with the IEEE Task Force responsible for IEEE P848 over the last 2 years to improve the subject procedure. This effort has resulted in recent revisions to the subject procedure which addressed the majority of the concerns raised by EELB (reference: Letter dated 10/13/94 from C. Berlinger to A. K. Gwal). Although not all of the concerns were addressed by the IEEE Task Force Dr. Berlinger indicated that the latest IEEE P848 draft procedure can be used by licensees or NEI as the basis for an ampacity derating test program. The latest procedure revision (Draft 16) addresses the major test concerns regarding inductive heating and conduit surface emissivities effects.

The staff emphasized that licensees should submit the actual test procedures or plans to the staff for comment. After discussion of the various options to develop a generic test program NEI agreed to review the CPSES 2 SE and then contact the staff as necessary for further discussions or questions on this matter.

cc: Alex Marion, NEI

CONTACT: Ronaldo Jenkins, EELB/DE
415-2985

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DATE	05/19/95		05/19/95		05/22/95	

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ATTACHMENT 1

9509140068 1p

The duplicate ampacity test on the cable tray with the corrugated steel cover was completed on Saturday, October 25, 1986. In this test, the electrical current required to attain a steady-state temperature of 90°C on the hottest cable conductor at the center of the cable tray configuration was 28.8 A with the ambient temperature at 39.6°C. For this test, the time period to attain the steady-state condition was approximately 48 h. A 4 h time period was allowed to elapse between the final current adjustment and initiation of the 1 h scan of temperatures within the cable tray configuration.

The only significant difference between the two ampacity tests conducted on the cable tray configuration with the corrugated steel cover was the time allowed for stabilization following the final current adjustment (15 min vs 4 h). Based on the disparity between the currents required to obtain steady state conditions in the two tests (24.9A vs 28.8A), it is plausible that the time period required to ensure steady-state conditions within the cable tray may be considerably greater than the time which had been allowed during the October 11, 1986 test.

The cable tray "baseline" ampacity test was conducted on September 30, 1986. The electrical current required to attain a steady-state temperature of 90°C on the hottest cable conductor at the center of the cable tray configuration was 32.1A with the ambient temperature at 40.3°C. For this test, the time period allowed for attainment of the steady-state condition was approximately 5 h. A 15 min time period was allowed to elapse between the final current adjustment and initiation of the 1 h scan of temperatures within the cable tray configuration.

In light of the findings from the duplicate ampacity test on the cable tray configuration with the corrugated steel cover, we (UL) decided that we would rerun the cable tray baseline test to verify that the 15 min time period between the final current adjustment and initiation of the 1 h scan of temperatures had been sufficient time for stabilization. Accordingly, immediately following the duplicate ampacity test on the cable tray configuration with the corrugated steel cover, the cover was removed and the current loading on the cables on the cable tray was adjusted to 32.1 A. The current loading was left on the cable tray over the weekend. On checking the cable tray sample on the morning of Monday, October 27, it was noted that the maximum cable conductor temperature at the center of the cable tray configuration was 82.5°C although the current had remained steady at 32.1 A. Accordingly, the electrical current was increased to attain the desired cable conductor temperature of 90°. The current adjustments were made over a 30 h period. A 4 h time period was allowed to elapse between the final current adjustment and initiation of the 1 h scan of temperatures within the cable tray configuration. The results of the ampacity test indicated that a current of 36.15 A was required to attain a steady-state temperature of 90.0°C (Thermocouple No. 16) at an ambient temperature of 40.2°C.

The ampacity investigation was conducted for you under an application for Special Services. In our application, we agreed to conduct the ampacity tests in accordance with the test method outlined by Bechtel Power Corp. with the understanding that the information developed in the investigation would be submitted only to Bechtel Power Corp. for their consideration as to the acceptability of the various field-applied coverings on redundant safety trains at the South Texas Project nuclear power plant. Representatives from Bechtel Power Corp. and Houston Lighting and Power Co. were present for the initial cable tray baseline ampacity test, the initial corrugated steel cover test and each test which employed your company's panels. It should be noted that the representative of Bechtel Power Corp. made the determination as to when the steady-state condition was reached in each of the above-mentioned ampacity test configuration on the cable tray system.

The duplicate test on the cable tray system with the corrugated steel cover and the duplicate cable tray baseline test were not requested by you and were conducted at our expense using a longer stabilization period following the final current adjustment than that which had been deemed adequate by the representative of Bechtel Power Corp. The duplicate tests were conducted in the interest of providing supplemental test data when it was noted that the accelerated conduct of the ampacity test investigation may have an impact on the test results. We are available to discuss these results and methodology with you or representatives of Bechtel Power Corporation if you so desire.

Very truly yours,

C. J. JOHNSON
Senior Engineering Associate
Fire Protection Department

Reviewed by:

R. M. Berhinig
Associate Managing Engineer
Fire Protection Department

CJJ/KDR:mjw
LTR5

cc: File
NFF - Writer (3)

December 30, 1986

Thermal Science Inc.
Mr. Rubin Feldman
2200 Cassens Dr.
St. Louis, MO 63026

Our Reference: 86NK23826, R6802

Subject: "Baseline" Ampacity For Cable Tray Configuration Used In Special Services Investigation

Dear Mr. Feldman:

This is to confirm my telephone conversations with you and Mr. Jim Rippe concerning the above subject.

On October 11, 1986, an ampacity test was conducted on the cable tray configuration with a corrugated steel cover secured to the top surface of the cable tray with stainless steel banding straps. The test was supervised by Mr. Mohan Bali of Bechtel Power Corp. and Mr. Jim Rippe of your company. The electrical current required to attain a steady-state temperature of 90°C on the hottest cable conductor at the center of the cable tray configuration was 24.9 A with the ambient temperature at 40.2°C. For this test, the time period allowed for attainment of the steady-state condition was approximately 5 h. A 15 min time period was allowed to elapse between the final current adjustment and initiation of the 1 h scan of temperatures within the cable tray configuration.

On October 17, 1986, we conducted the ampacity test on the cable tray configuration with a flat No. 16 gauge galvanized steel plate cover secured to the top surface of the cable tray with carbon steel banding straps. The electrical current required to attain a steady-state temperature of 90°C on the hottest cable conductor at the center of the cable tray configuration was 27.35 A with the ambient temperature at 40.1°C. For this test, the time period to attain the steady-state condition was approximately 48 h. A 4 h time period was allowed to elapse between the final current adjustment and initiation of the 1 h scan of temperatures within the cable tray configuration.

Since it seemed illogical that the cable tray configuration with the flat steel cover would have a higher ampacity than the cable tray configuration with the corrugated (vented) steel cover, we (UL) decided to rerun the test on the cable tray with the corrugated steel cover to verify the October 11, 1986 test data.

ATTACHMENT 2

TSI AMPACITY INVESTIGATION - SUMMARY

CONFIGURATION	DATE	CURRENT, A	CNDR. TEMP., °C	T.C. No.	AMB. TEMP. °C	% DERATING* BOGUS	% DERATING* REAL
CABLE TRAY BASELINE (OLD ENCL.)	9-23-86	32.5	90.1	39 (19)	39.9	—	—
CABLE TRAY - 1" REG. DEN. PNLS.	9-24-86	22.0	90.2	39 (19)	40.2	32.3	—
" " - " " " "	9-25-86	22.0	90.1	39 (19)	40.0	32.3	—
CABLE TRAY BASELINE (NEW ENCL.)	9-30-86	32.1	89.9	17	40.3	—	—
" " " " "	10-28-86	36.15	90.0	16	40.2	—	—
CABLE TRAY - 1" REG. DEN. PNLS.	9-29-86	22.1	90.2	18	40.0	31.2	38.9
CABLE TRAY - ½" REG. DEN. PNLS.	9-30-86	23.1	90.0	18	40.0	28.0	36.1
CABLE TRAY - 1" LOW DEN. PNLS.	10-11-86	19.5	90.3	19	40.3	39.3	46.1
CABLE TRAY - ½" LOW DEN. PNLS.	10-2-86	21.7	90.3	17	40.1	32.4	40.0
CABLE TRAY - CORRUG. STL. TOP PLT.	10-11-86	24.9	90.3	17	40.2	22.4	31.1
" " - " " " "	10-25-86	28.8	90.1	17	39.6	10.3	20.3
CABLE TRAY - FLAT STL. BOTTOM PLT.	10-23-86	28.5	90.3	18	40.1	11.2	21.2
CABLE TRAY - FLAT STL. TOP PLT.	10-17-86	27.35	90.0	17	40.1	14.8	24.3
CABLE TRAY - FLAT STL. TOP & BTM. PLTS.	10-. 2-86	19.9	90.2	18	40.2	38.0	45.0
" " - " " " " "	10-20-86	19.5	90.1	18	40.2	39.3	46.1
SINGLE CABLE IN FREE AIR	10-15-86	98.3	89.2	9	40.2	—	—
CONDUIT BASELINE	10-9-86	34.1	90.2	2	40.1	—	—
CONDUIT - ½" REG. DEN. PREFORM. PNLS.	10-10-86	34.8	90.1	2	40.2	(2.1)	—
CONDUIT - 1" REG. DEN. PREFORM. PNLS.	10-8-86	30.9	90.1	2	40.1	9.4	—

* ALL PANELS SUPPLIED BY TSI APPEARED "WET" (UNCURED) &, IN THE OPINION OF THE PROJECT ENGINEER, WERE NOT REPRESENTATIVE OF INSTALLED FIELD CONDITIONS. REPRESENTATIVES OF BECHTEL POWER CORP. DETERMINED THAT SAMPLES WERE OK & TEST COMMENCED. IN THE OPINION OF THE PROJECT ENGR., ALL TESTS W/ THE TSI PRODS. WERE BOGUS BECAUSE OF (1) UNCURED PRODS., (2) INSUFFICIENT STABILIZATION TIME & (3) BOGUS BASELINE TESTS ON 9-23-86 & 9-30-86. DERATINGS DERIVED FROM CABLE TRAY BASELINE TEST ON 10-28-86 ARE DEEMED MORE REALISTIC, ALTHOUGH THE "WET" CONDITION OF THE PANELS [illegible]

Attachment B