U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION IV

Report No. 50-498/81-10; 50-499/81-10

Docket Nos. 50-498; 50-499 Category A2

Licensee: Houston Lighting and Power Company
Post Office Box 1700
Houston, Texas 77001

Facility Name: South Texas Project, Units 1 and 2

Inspection at: South Texas Project, Matagorda County, Texas

Inspection Conducted: March 30 - April 2 and April 6-9, 1981

Inspector: _____ 5-7-81
J. I. Tapia, Reactor Inspector, Engineering and Materials Section Date

Other Accompanying Personnel: W. C. Seidle, Chief, Engineering Inspection Branch (April 2-3, 1981)

C. E. Johnson, Reactor Inspector, Engineering and Materials Section (training)

Approved: _____ 5-7-81
R. E. Hall, Acting Chief, Engineering and Materials Section Date

Inspection Summary:

Inspection conducted during March 30 - April 2 and April 6-9, 1981
Report No. 50-498/81-10; 50-499/81-10)
Areas Inspected: Routine, unannounced inspection of construction activities relative to the limited restart of complex concrete placement and follow up on unresolved items and Show Cause Order items. The inspection involved fifty-six inspector-hours by one NRC inspector.
Results: In the areas inspected, one violation was found in the area of concrete placement (violation - failure to test for air content of grout - paragraph 3)

DETAILS

1. Persons Contacted

Principal Licensee Employees

R. A. Frazar, Manager, Quality Assurance
*R. A. Carvel, Project QA Supervisor - Civil
L. D. Wilson, Project QA Supervisor - Welding
R. J. Viens, Senior QA Specialist
B. R. Schulte, Civil QA Specialist
T. H. McGriff, Civil QA Specialist
G. W. Steinmann, Lead Site Engineer - Civil

Other Personnel

B. C. Pettersson, Lead Geotechnical Engineer, Brown and Root (B&R)
R. Rozier, Area Civil Engineer - RCB-I, B&R
G. Cook, Field Engineer, B&R
C. Younger, Project Site Engineer - Civil/Structural, B&R
P. Steger, Lead Site Engineer - Civil/Structural, B&R
C. M. Singleton, Civil QC Superintendent, B&R

The NRC inspector also contacted other licensee and contractor personnel including members of the QC and engineering staffs.

*Denotes attendence at the exit interview.

2. Licensee Action on Previous Inspection Findings

During this inspection, licensee action taken to resolve the following unresolved item identified in Investigation Report No. 50-498/79-19; 50-499/79-19 was reviewed:

(Closed) Unresolved Item (50-498/79-19-23; 50-499/79-19-23): Records of Fill Lifts Versus Location in Order to Reconstruct Fill Placement Procedure Lacking. The subject unresolved item has been incorporated in the licensee's response to Show Cause Order Item VA(2)(c). Plan views and profiles to show the sequence of backfill placement have been developed. The closure of the Show Cause Order Item in paragraph 4 of this report resolves the issue originally generated by this unresolved item.

3. Concrete Placement

By letter, dated January 8, 1981, the licensee requested a limited restart of complex concrete placement. Attachment 1 to the letter defined the scope of work as seven specific placements by number. The review of corrective actions taken by the licensee, as of the date of the request, resulted in concurrence with the request for a limited restart of complex concrete. The seventh placement was observed by the NRC inspector during this inspection.

This placement (No. CIS-W18) consisted of the eighteenth lift on the Unit 1 Reactor Containment Building. The observed placement and consolidation techniques were found to be in accordance with Quality Control Construction Procedure No. A040KPCCP-25 and consistent with standard industry practices for the successful placement of concrete.

A review was conducted of the quality control records for the first six complex concrete placements. From this review and through discussions with cognizant peronnel, it was determined that no testing for air content of Grout Mix Identification No. A-0-3-15 had been performed. Brown and Root Interoffice Memorandum No. GM-46667, "Approved Concrete Mixes," requires that the air content for Grout Mix Identification No. A-0-3-15 not exceed 10 percent. This memorandum is an attachment to approved Field Change Request No. 0-C-0063-A-B to Brown and Root Specification No. 2A010CS001-G, "Concrete Supply." The Field Change Request served to document the current approved concrete and grout mixes. The failure to test for air content of grout in order to assure compliance with the design maximum amount allowable represents a failure to meet the requirements of Criterion XI of Appendix B to 10 CFR Part 50 and is therefore a violation.

4. Licensee Response to Show Cause Order

The NRC inspector reviewed the licensee's response to the Show Cause Order transmitted to HL&P by NRC letter, dated April 30, 1980. The following items were addressed:

(Closed) Show Cause Order Item VA(2)(c): Provide Information to Address the Sequence of Construction of Existing Backfill Including the Loose Lift Thickness and Number of Passes of the Equipment. The Independent Expert Review Committee's "Final Report Concerning Show Cause Order Item 2," dated January 30, 1981, was reviewed during this inspection. Section 4.8 of the Committee's report addresses their review of the B&R/HL&P Special Task Force effort in addressing this Show Cause Order Item. It was the Committee's determination that the backfill placements can be reconstructed from the quality control records. The Task force effort is documented in Technical Reference Document No. 3A700GP001-B, "Category I Structural Backfill Placement and Quality Control Data." This document which was also reviewed during this inspection reports eight representative cross sections, four from each unit, which were developed from the review of Earthwork Inspection Reports, Soils Inspection Checklists and Density Test Reports. The cross sections shown in the report depict a typical compacted lift thickness of 15 inches which is based on the Soils Inspection Checklist notations that the lift thicknesses were 18 inches or less. The lift numbering sequence established for each placement area also gives the particular lift elevation. The report further states that the total number of roller passes, although not documented, was such that the compactive effort satisfied the requirement of a minimum of eight one way passes prior to commencement of in-place

density testing. The development of the cross sections from the quality control records is used as a basis to demonstrate that the backfill was placed in a determinate sequence. Based on the review of this documentation performed during this inspection, the NRC inspector concluded that the licensee has satisfied the Show Cause Order to provide information to address the sequence of construction of existing backfill including the loose lift thickness and number of passes of the equipment.

This item is closed.

(Closed) Show Cause Order Item VA(2)(d): Provide Information to Address the Adequacy of Existing Backfill Material Including That Under Structures Founded on Backfill. The Independent Expert Review Committee's "Final Report Concerning Show Cause Order Item 2" also addresses the engineering adequacy of the in-place density of the Category I structural backfill. Their evaluation is based on considerations of the backfill material properties, the construction techniques, the in-place density test results, and the boring program. The Committee has concluded that "a dense, homogeneous, compacted structural backfill resulted which is adequate for the intended use and is generally in accordance with specification requirements." Four small, isolated zones detected by the boring program, which indicated a relative density less than construction quality control criteria, were anlayzed and found to have a factor of safety against liquefaction of greater than 1.5 for three zones and a minimum factor of safety of 1.35 for the fourth. The Committee further concluded that, since the boring locations were selected in an unbiased manner, their number is adequate to provide a representative sample of fill conditions. The actual field control procedures for placement of the fill and for determining relative density were found to yield a statistically determined mean relative density of 95 percent with a standard deviation of 9.85. The statistical analysis further shows, with a 90 percent level of confidence, that less than 4.0 percent of the backfill volume has a relative density less than 80 percent, and that 0.05 percent is less than 70 percent. Based on these results, the Committee reports that "Even if portions of the structural backfill have relative densities as indicated by the statistical analysis results, we still conclude that there is no risk of liquefaction." A similar conclusion was reached for the analysis of thin layers immediately below mat foundations at a relative density of 45 percent. The factor of safety against liquefaction for this analysis was found to be in excess of 1.8. The need for this analysis resulted from the results of the June 1980 test fill program in which it was shown that there is uniformity of compaction throughout the backfill placed in 18 inch lifts, except for the upper portion of the top lift. The test fill program also showed that the density testing depth below the backfill surface is not a critical factor and that eight roller passes is a satisfactory starting point

to commence acceptance testing. Based on the reviews performed during this inspection of the Independent Expert Review Committee's "Final Report Concerning Show Cause Order Item 2" and of the Task Force's Technical Reference Document, the licensee has concluded that the existing backfill material satisfies the design intent.

The above noted Independent Expert Review Committee's "Final Report Concerning Show Cause Order Item 2" was also reviewed during this inspection to confirm that items previously closed by the NRC inspector, based on the Committee's interim and status reports, were consistent with the final report. There were no differences noted between the interim and status and final reports which affect previous item closures. At the request of IE Headquarters, the final report will also be reviewed by the Geotechnical Branch of the NRC's Office of Nuclear Reactor Regulation (NRR). In particular, the Committee's conclusions relative to the calculations supporting the liquefaction potential, the adequacy of the methods previously utilized for backfill placement and compaction, and the significance of noted shifts in maximum and minimum densities from values reported in the FSAR will be evaluated by NRR.

This item is closed.

5. Show Cause Order Commitments

The NRC inspector reviewed the implementation of the commitments described in the attachment to HL&P letter ST-HL-AE-533, dated September 18, 1980. The following commitments, utilizing the identification numbers in the attachment to the LH&P letter, were reviewed:

(Closed) Items A20, A21, A25, A27, A28, A29, A30, A31, M8, M9, M10, M11, M13, and M16: The listed items relate to and serve as the basis for the closure of the Show Cause Order Items listed in paragraph 4 of this report. In addition, the above listed commitments were individually reviewed and found to have been met and were therefore closed.

6. Exit Interview

The NRC inspector met with the licensee representative denoted in paragraph 1 on April 9, 1981, for the purpose of summarizing the scope and the findings of the inspection.