APPENDIX

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

REGION IV

Report: 50-498/81-22; 50-499/81-22 Category A2

Docket: 50-498; 50-499

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

Facility Name: South Texas Project, Units 1 and 2

Inspection at: Brown & Root Engineering Office, Houston, Texas

Inspection Conducted: June 29-July 2, 1981

Inspectors: _____ 9-4-81
J. I. Tapia, Reactor Inspector, Engineering and Materials Section Date

_____ 9-4-81
R. E. Hall, Acting Chief, Engineering and Materials Section (June 29, 1981, only) Date

Approved: _____ 9-4-81
R. E. Hall, Acting Chief, Engineering and Materials Section Date

Inspection Summary:

Inspection Conducted During June 29-July 2, 1981 (Report 50-498/81-22; 50-499/81-22)
Areas Inspected: Special, announced inspection of construction activities relative to items reported under 10 CFR Part 50.55(e) and follow up of unresolved items. The inspection involved 30 inspector-hours at the Brown and Root Engineering Office by two NRC inspectors.
Results: No violations or deviations were identified.

DETAILS

1. Persons Contacted

Principal Licensee Employees

*J. H. Goldberg, Vice President of Nuclear Engineering and Construction
D. G. Barker, Project Manager
R. A. Frazar, Manager of Quality Assurance
R. A. Carvel, Project QA Supervisor - Civil
R. L. Engen, Civil/Structural Engineer
*J. G. White, Licensing and Technical Coordinator
R. A. Raymond, Civil/Structural Engineer
*J. L. Blau, Project Engineering Manager
*R. J. Viens, Quality Assurance Engineer
*H. G. Overstreet, Project QA Supervisor - Procurement
*L. R. Jacobi, Supervising Engineer
*R. R. Hernandez, Supervising Engineer
D. J. Kopal, Civil/Structural Engineer

Other Personnel

*G. R. Murphy, Civil/Structural Engineer, Brown & Root (B&R)
S. M. Dew, Assistant Engineering Project Manager, B&R
J. L. Hawks, Engineering Project Manager, B&R
E. A. Saltarelli, Senior Vice President - Engineering, B&R
F. Muellner, Vice President - Nuclear Engineering, B&R
R. Radhakrishnan, Supervisor - Structural Engineering, B&R
B. D. Pointer, Supervising Design Engineer - Concrete Technology

*Denotes attendance 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 50-498/79-19; 50-499/79-19 was reviewed:

(Closed) Unresolved Item (50-498/79-19-14; 50-499/79-19-14): Correlation Testing of Pumped Concrete. During investigation No. 50-498/79-19; 50-499/79-19, the NRC inspector observed that, for pumped concrete, sampling for air content, slump, temperature, and strength test specimens was performed at the truck discharge and not at the point of placement as specified in ACI 304-73 and ANSI N45.2.5-1974. The NRC inspector further noted that continuing correlation testing was not being performed as specified in ANSI N45.2.5-1978. As of the investigation, the STP practice of sampling pumped concrete only at the truck discharge had not been accepted by NRC's Office of Nuclear Reactor Regulation (NRR) and was the subject of FSAR question 130.25 from NRR.

By letter of October 31, 1980, HL&P transmitted its "Revised Quality Assurance Program Descriptions and Response to NRC Questions." The NRR staff has reviewed HL&P's commitments to meet quality assurance requirements for the installation, inspection and testing of structural concrete and have found the transmitted document satisfactory for construction at the STP. With the exception noted in Note 1 beginning on page 53 of the document, HL&P commits itself to comply with ANSI N45.2.5-1974. The exception allows the taking of in-process strength samples of pumped concrete at the delivery point. Correlation tests of air content, slump, and temperature are performed to verify these properties of the concrete at the placement point in accordance with the following frequency requirements:

a. A minimum of 2 correlation tests are performed for each pumped placement exceeding 200 cubic yards.

b. Otherwise, a minimum of 2 correlation tests per week are performed when any individual pumped placement during a week requires delivery of more than one truckload of concrete.

c. During a week when a pumped placement exceeding 200 cubic yards is made, the correlation tests performed on that placement will satisfy the weekly requirement for performing two correlation tests as specified in item b. above.

When any of the specified limits and tolerances on loss of air content, slump, or temperature are exceeded at the placement point, correlation tests between the delivery point and placement point will be accomplished for each 100 cubic yards of concrete placed as long as limits and tolerances are exceeded. If two consecutive tests are found out of tolerance, corrective action will be implemented to assure that subsequent loads awaiting discharge into the pump are within tolerances for the placement. Correlation tests, delivery point, and placement point are as defined in ANSI N45.2.5-1978, Section 1.4.

Based on NRR's review and approval of HL&P's program for correlation testing of pumped concrete, this item is closed.

During this inspection, a follow-up review of the following previously closed item was conducted to assure that the requirements of ANSI/ASTM C94-80, "Standard Specification for Ready Mixed Concrete," were incorporated into the implementing procedures for the transport of concrete.

(Closed) Unresolved Item (50-498/79-19-12; 50-499/79-19-12): Concrete Transit Trucks Standing or in Transit Without Agitation. During this inspection, the requirement in Section 10.6 of ANSI/ASTM C94-80 for any turning during transportation to be done at the speed designated

by the manufacturer of the concrete truck as agitating speed was reviewed for incorporation into on-site procedures. This requirement relates to those instances when a truck mixer or truck agitator is used for transporting concrete that has been completely mixed in a stationary mixer and as such does not permit any turning during transportation to be done at the speed designated as idle speed. This requirement was found to have been incorporated in Brown and Root Specification No. CS001, "Concrete Supply," and in Pittsburgh Testing Laboratories Procedure No. QC-CBP, Revision 2, "Concrete Batch Plant Inspection." The findings during Investigation 50-498/79-19; 50-499/79-19 addressed those instances when concrete transit trucks were observed in transit with the drum speed set at idle. This follow-up review serves to clarify the requirement for agitation during transit as opposed to the requirement for mixing after water is added to the truck.

This item remains closed.

3. Review of Items Reported Under 10 CFR Part 50.55(e)

A review was conducted of Quality Assurance documentation relative to the following construction deficiencies reported under 10 CFR Part 50.55(e):

a. Concrete Voids, RCB-1, Lift 8

On June 18, 1979, the licensee reported the existence of voids in the concrete in Lift 8 of the Unit 1 Reactor Containment Building (RCB). The voids were discovered as a result of the investigation promulgated by the discovery of voids in Unit 1, Lift 15 (See NRC Report 50-498/81-16; 50-499/81-16). The licensee conducted an investigation to determine the location and extent of the unacceptable areas. Conclusions based upon the investigation indicated that the voids occurred in areas beneath containment penetrations and beneath the 8 inch channel which served as the liner plate stiffener. After sounding, exploratory drilling, and visual examination of the holes using fiberoptics, all voids were hydrostatically pressure tested to determine which voids were interconnected. Masterflow 814 grout was then injected at the lowest open insert for an individual repair area as determined by the hydrostatic pressure test. As the grout filled the void, successively higher insert holes were closed as the grout flowed out of the holes. This technique allowed the escape of air, thus assuring a solid repair. The holes drilled into the liner plate were repaired using couplings and plugs. The couplings were machined to fit the holes and welded to the liner in accordance with ASME requirements. After grouting, plugs were inserted into the couplings and seal welded. The adequacy of this repair

technique was verified following the repair of Lift 15 in RCB 1. Corrective action to prevent recurrence of similar voids during future placements included retraining of construction, engineering, and Quality Control personnel relative to the problems which contributed to the formation of the voids. The training included future consideration of equipment failure, excessive placement time, and the proper procedures which are to be followed in the event of concrete placement difficulties. The final report on this matter was submitted by the licensee on February 18, 1980.

Based on the review of this report by the NRC inspector, this construction deficiency is considered closed.

b. Liner Plate Bulge, RCB-2

During the void investigation of RCB-2, the steel liner was inadvertently damaged, on January 14, 1980, while making volumetric determinations of concrete voids by injection of water under pressure. This deficiency resulted in a citation entitled, "Failure to Follow Test Procedure," which is documented in NRC Report 50-498/80-01; 50-499/80-01. The bulge was subsequently reported as a construction deficiency within the context of 10 CFR Part 50.55(e). During Inspection No. 50-498/80-12; 50-499/80-12, the NRC inspector observed the chipped back concrete surface. The deformed 10 feet by 14 feet portion of the steel liner has been replaced and the void behind the plate was grouted in accordance with the procedure previously established for the repair of Lifts 8 and 15 in RCB-1. The recurrence control involved procedural modifications which were addressed in NRC Inspection Report No. 50-498/80-24; 50-499/80-24. The final report on this deficiency was submitted by the licensee on May 22, 1981.

Based on the review of this report by the NRC inspector, this construction deficiency is considered closed.

c. Seismic Qualification of Equipment

On May 29, 1980, the licensee reported that the Safe Shutdown Earthquake (SSE) response spectra values used in designing the Essential Cooling Water Intake Structure (ECWIS) gantry crane and the Diesel-Generator Fuel Oil Storage Tanks were developed by multiplying the Operating Basis Earthquake (OBE) values by 1.5 rather than by the required factor of 2.0. Seismic requalification was performed incorporating the higher 2.0 factor.

During this inspection, the updated calculations were reviewed and were found to show that the utilization of the 2.0 seismic amplification factor would not result in any required design modifications to the equipment.

Based on the review of the updated calculations by the NRC inspector, this construction deficiency is considered closed.

4. Complex Concrete Restart Program

On April 2, 1981, the licensee requested that the Complex Concrete Restart Program be modified by including an additional fourteen complex placements. The original Complex Concrete Restart Program is based on commitments contained in HL&P letters ST-HL-AE-555 and ST-HL-AE-572. By letter dated April 16, 1981, the NRC regional staff concurred with expanding the Complex Concrete Restart Program with the exception of three RCB-1 dome placements (CS1-R1, R2, and R3). Additional information regarding the method for verifying the location of the dome tendon sheathing within specified radial tolerance was requested for the excepted placements. On June 29, 1981, the NRC inspectors met with the licensee staff to discuss the methodology utilized for verifying that the radial location of the dome tendon sheathing under maximum in and out tolerances would not result in an unacceptable loss of tension from the friction due to snaking. Documentation from the post-tensioning system designer (Prescon Corporation) addressing their review of the tolerances associated with the dome tendon sheathing was reviewed during this inspection. The review disclosed that locating the dome tendon sheathing to the prescribed tolerances would result in an acceptable prestressing force. Specifically, the frictional losses attributed to the snaking of the sheathing at the maximum allowable tolerances should have a negligible effect on the prestressing tension force.

Based on the information discussed on June 29, 1981 and on the documentation reviewed, the NRC regional staff concurred by letter dated July 21, 1981 with including the three RCB-1 dome placements in the Complex Concrete Restart Program.

5. Slickline Grout Testing

(Closed) Violation (50-498/81-10; 50-499/81-10): During the June 29, 1981 meeting described in paragraph 4 above, discussions were also held regarding the Notice of Violation contained in NRC Report No. 50-498/81-10; 50-499/81-10. This violation concerned the requirement that the air content for Grout Mix Identification No. A-0-3-15 not exceed ten percent and the subsequent finding by the

NRC inspector that no testing for air content of the first six complex concrete placements permitted by NRC Immediate Action Letter, dated January 13, 1981, was performed. During Inspection No. 50-498/81-10; 50-499/81-10, the NRC inspector observed during concrete placement No. C1S-W18 that no testing frequency or acceptance criteria had been established in project specifications or procedures for field testing of the grout. Since the amount of grout represented approximately ten percent of the total placement and since this volume of grout resulted from the procedural requirement to order grout based on a four inch layer at the construction joint, the NRC inspector researched the original design mix for the grout which disclosed the ten percent air content limit. As a result of the meeting,the licensee committed to modifying the procedural requirements for ordering grout such that the amount ordered will be based on a one inch layer at the construction joint. This reduction in volume of grout will delete the requirement for obtaining quantitative quality control documentation of the adequacy of the grout since it no longer would be a significant portion of the structure. The quality of the minimal amount of grout will be assured by monitoring the dosage rates of air-entraining admixture. This technique was addressed by reviewing batch plant records and the results of periodic compressive strength tests.

Based on this review and on the commitment to modify the quantity of grout being used, this violation is considered closed.

6. Exit Interview

The NRC inspector met with the licensee representatives denoted in paragraph 1 on July 2, 1981, for the purpose of summarizing the scope and the results of the inspection.