

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

REGION IV

Report: 50-498/81-16; 50-499/81-16

Docket: 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: Brown & Root Engineering Office, Houston, Texas

Inspection Conducted: May 19-22 and June 3-11, 1981 (In-Office)

Inspector: *R. E. Hall* 6/23/81
J. I. Tapia, Reactor Inspector, Engineering and Materials Section Date

Approved: *R. E. Hall* 6/23/81
R. E. Hall, Acting Chief, Engineering and Materials Section Date

Inspection Summary:

Inspection Conducted During May 19-22 and June 3-11, 1981 (Report 50-498/81-16;
50-499/81-16)

Areas Inspected: Special, announced inspection of construction activities relative to items reported under 10 CFR Part 50.55(e) and follow up on Show Cause Order items. The inspection involved 26 inspector-hours at the Brown & Root Engineering Office and 16 inspector-hours of in-office documentation review by one NRC inspector.

Results: No violations or deviations were identified.

DETAILS

1. Persons Contacted

Principal Licensee Employees

- J. W. Briskin, Manager of Houston Operations
- *M. E. Powell, Licensing Team Leader
- R. A. Carvel, Project QA Supervisor - Civil
- *R. J. Viens, Senior QA Specialist
- *R. R. Hernandez, Lead Engineer - Structural

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

*Denotes those attending the exit interview.

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

During this inspection, a review was conducted of Quality Assurance documentation relative to the following construction deficiencies reported under 10 CFR Part 50.55(e):

a. Surveying Error, MEAB-2

On October 4, 1978, the licensee reported a surveying error in the base mat of the Unit 2 Mechanical Electrical Auxiliary Building (MEAB). The source of the error was attributed to using Column Line R.1 in the Fuel Handling Building (FHB) as the reference centerline instead of the Reactor Containment Building (RCB) centerline. Since Column Line R.1 is offset one foot to the west of the RCB centerline, the east edge of the MEAB-2 was laid out one foot short of design. Redesign of the west one-fourth of the MEAB-2 to compensate for the one foot dimensional error has resulted in only interior spatial alteration. Distances between column lines were reduced and some excess floor space was eliminated. The general arrangement of equipment within the redesigned area remains unchanged. An evaluation of the redesign was performed against the safety criteria and bases stated in the SAR for layout of systems and components by the designer.

The cause of the surveying error was attributed to a failure by Field Engineering to properly check survey calculations. To preclude recurrence of survey calculation errors, independent verification of the layout crew's calculations has been initiated to provide for a double level of checking. In addition, an additional layer of supervision responsible for thoroughly checking all layout calculations has been added.

As a result of the NRC inspector's review of the engineering evaluation and redesign taken to correct the one foot surveying error, this construction deficiency is considered closed.

b. Structural Backfill Blow-Count, Unit 2

On March 21, 1980, the licensee reported the identification of areas of nonconforming backfill material adjacent to the Unit 2 power block. Specifically, four areas were identified where the specified Quality Control criteria of 80 percent relative density, as interpreted from penetration testing, were not met. A supplemental boring program was initiated to further identify the extent of the nonconforming structural backfill. The results of the boring program along with the evaluation performed by an Independent Expert Review Committee were addressed by the NRC inspector in the review of the licensee's response to 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 NRC inspector's review of the Show Cause Order item, documented in NRC Inspection Report 50-498/81-10; 50-499/81-10, serves to close this reported construction deficiency.

c. Excessive Concrete Lift Thickness, DGB-1

On June 5, 1980, the licensee reported a potentially reportable deficiency concerning excessive lift thickness of a concrete placement in the Unit 1 Diesel Generator Building (DGB). The deficiency occurred when a 3½-foot lift was allowed to develop during Placement No. DG1-W3A rather than the specified 1½-foot maximum. The B&R QC inspector dispositioned the deviation from specification by immediately revibrating the area. The B&R QC inspector was subsequently reprimanded because he did not stop the placement, document the condition on a Nonconformance Report (NCR), and obtain Design Engineering disposition prior to continuing the placement. The NRC inspector reviewed documentation of the reprimand which states that the B&R QC inspector now understands that he does not have the authority to disposition a specification or procedural violation. Nonconformance Report S-C4294 was subsequently written to document the procedural violation. Closure of the NCR included visual examination of the completed placement to verify structural adequacy of the wall in question. Although the B&R QC inspector's decision to revibrate the area in question was a procedural violation, it resulted in the excessive lift being adequately vibrated and thus prevented the formation of voids or honeycombing. Based on the review of the actions taken by the licensee to evaluate this potential deficiency, the NRC inspector had no further questions regarding the licensee's determinations that this condition, if left uncorrected, would not have adversely affected the safety of operation of the plant and his decision that this incident is not reportable under 10 CFR Part 50.55(e).

This matter is considered closed.

d. Concrete Voids, RCB-1, Lift 15

On October 20, 1978, the licensee reported the existence of voids in the concrete in Lift 15 of the Unit 1 Reactor Containment Building (RCB) exterior wall from elevation 127'-0" to 138'-0". The licensee conducted an investigation to determine the location and extent of unacceptable areas. The placement geometry and history were evaluated and suspect areas behind the polar crane brackets where voids could be expected were identified. Exploratory drilling, sounding, and visual examination of the holes using fiberoptics were the primary methods used to determine the extent and location of the unacceptable areas. Conclusions based upon the investigation indicated that there were three conditions requiring grout injection behind the liner. These included areas visible at the top of the lift, areas beneath the polar crane brackets, and areas beneath the horizontal eight-inch channel liner plate stiffeners. The cause of the deficiency can be attributed to the combined effects of inadequate planning, longer than normal pump discharge lines, an unusually long placement time, and concrete pump breakdowns. In addition, the procedural provisions for stopping of work due to problems were not exercised by construction or Quality Control.

The material selected to fill the voids behind the liner (Masterflow 814 grout) was chosen based on a program of laboratory and field tests to verify the suitability of the material for its intended use. The grout was mixed and injected in accordance with a procedure specifically developed for this repair. Following grout injection, twelve locations were selected at random for drilling of holes into the bracket areas to determine whether or not there were any ungrouted voids and to inspect the quality of the grout in place and the grout-concrete interface condition. No voids were found and the interface showed that, based upon a testing program, the grout repair would be adequate in transferring the forces from the polar crane bracket to the wall as well as reacting to these forces within the allowable stresses. In addition, the polar crane bracket at azimuth 215° was load tested to a maximum vertical load of 375 tons, which is the predicted load it will see during the polar crane test lift of 520 tons. Strain and deflection gauges were used to determine the load-deformation characteristics of the bracket structure. This additional verification of repair adequacy showed that the structure behaved elastically, thus showing a satisfactory repair.

Corrective action to prevent recurrence of similar voids during future placements included retraining of construction supervisors and engineers along with 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 June 5, 1979. Based on the review of this report by the NRC inspector, this construction deficiency is considered closed.

3. 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(3)(b): Review Safety-Related Concrete Structures Including Embedments Such as Supports and the Fuel Transfer Tube. The licensee's "Final Report of the Review of Safety-Related Concrete," was reviewed by the NRC inspector during this inspection. This report was prepared by a Special Task Force composed of representatives from Houston Lighting & Power Company and Brown & Root. In addition, a panel of outside consultants with specialized expertise contributed to the Task Force effort. This panel was composed of Mr. Joseph F. Artuso, President of Construction Engineering Consultants; Mr. Thomas J. Reading, PE, FACI, FASCE; Dr. Richard C. Mielenz, PE; and Dr. J. Leroy Folks, Statistics Department Chairman, Oklahoma State University. The Task Force effort is documented in Technical Reference Document (TRD) No. 2A700GP003, "Review of Safety-Related Concrete Structures Including Embedments," which was also reviewed by the NRC inspector during this inspection. This TRD sets forth the criteria and procedures which were used in the investigation of the safety-related concrete structures and embedments. The TRD specifies the detailed and defined tasks and the forms and checklists which were used in the data collection and review. The Task Force inspected six major safety-related structures: the Reactor Containment Building internals, the Mechanical Electrical Auxiliary Building, and the Fuel Handling Building for both Units 1 and 2. Five generic types of placements in each building were investigated using a four-phase program consisting of documentation evaluation, as-built verification, visual inspection, and physical testing. In addition, two members of the consultant panel (Messrs. Artuso and Reading) evaluated the previous investigation and repair of the voids in the Units 1 and 2 RCB exterior walls. The review of the fuel transfer tube was addressed in NRC Inspection Report 50-498/81-06; 50-499/81-06.

Based upon the review performed during this inspection and during the inspections documented in NRC Inspection Reports 50-498/80-38; 50-499/80-38 and 50-498/81-03; 50-499/81-03, this completes the NRC inspection of the licensee's actions which resulted in the licensee's determinations that there are no internal honeycomb or void areas, that the major reinforcing steel conforms to the design requirements, and that there are no areas requiring major repairs. These conclusions are based on the four-phase investigation program with specific emphasis on visual inspection, Windsor Probe readings, ultrasonic testing, and petrographic and compressive strength evaluation of

drilled cores. The licensee's submittal of the "Final Report of the Review of Safety-Related Concrete" satisfies the Show Cause Order to review safety-related concrete structures including embedments such as supports and the fuel transfer tube in order to determine if such work was properly performed.

This item is closed.

(Closed) Show Cause Order Item VA(10): Verify or Correct if Necessary the FSAR Statements Contained in Section 2.5.4, "Stability of Subsurface Materials," especially Section 2.5.4.5, "Excavations and Backfill." A comprehensive evaluation of FSAR Section 2.5.4 has been completed by the licensee and the results of that evaluation indicate that only FSAR Subsections 2.5.4.5.6.2.4 and 2.5.4.5.6.2.5 required amendment. The two subsections required amendment in order to clarify the role of the testing agency (PTL) QC inspectors and to document Infraction 50-498/79-19-22; 50-499/79-19-22, "Failure to Take Prompt Corrective Action When Test Apparatus Failed, Halting Testing." This infraction was closed out during NRC Inspection 50-498/80-17; 50-499/80-17. Through discussions with the cognizant Lead Geotechnical Engineer and as a result of the closure of Show Cause Order Item VA(2)(b), the other parts of Section 2.5.4 are considered valid.

This item is closed.

4. Show Cause Order Commitments

The NRC inspector has 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 HL&P letter, have been individually reviewed and are considered closed:

(Closed) Items A20 through A33 and M7 through M16 and H18 through H22. The listed items relate to and serve as basis for the closure of Show Cause Order Items VA(2)(a) through VA(2)(e).

(Closed) Items A88 through A115 and M19 through M26 and H7. The listed items relate to and serve as basis for the closure of Show Cause Order Item VA(3)(c).

(Closed) Items M12 through M16. The listed items relate to and serve as basis for closure of Show Cause Order Item VA(10).

5. Exit Interview

The NRC inspector met with the licensee representative denoted in paragraph 1 on May 22, 1981, for the purpose of summarizing the scope and the findings of the inspection.