

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

39

REGION IV

Report No. 50-498/78-04; 50-499/78-04

Docket No. 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 & 2

Inspection at: South Texas Project, Matagorda County, Texas

Inspection conducted: March 21-23, 1978

Inspectors: *W. G. Hubacek* 4-11-78
W. G. Hubacek, Reactor Inspector, Projects Section
(Paragraphs 1, 2, 3, 4, 5 & 12) Date

A. B. Rosenberg 4-10-78
A. B. Rosenberg, Reactor Inspector, Engineering
Support Section (Paragraphs 6 & 7) Date

L. D. Gilbert 4-11-78
L. D. Gilbert, Reactor Inspector, Engineering
Support Section (Paragraphs 8 & 9) Date

J. I. Tapia 4-11-78
J. I. Tapia, Reactor Inspector - Intern, Engineering
Support Section (Paragraphs 10 & 11) Date

Approved: *W. A. Crossman* 4-11-78
for W. A. Crossman, Chief, Projects Section Date

W. A. Crossman 4-11-78
for W. A. Crossman, Acting Chief, Engineering Support
Section Date

Inspection Summary:

Inspection on March 21-23, 1978 (Report No. 50-498/78-04; 50-499/78-04)

Areas Inspected: Routine, unannounced inspection of construction activities including observation of work and review of records related to Unit 2 containment liner erection; observation of work and review of records related to concrete placement for Unit 1; review of records related to soil conditions for Unit 1 and 2 foundations; and follow up on previously identified inspection findings. The inspection involved eighty inspector-hours by four NRC inspectors.

Results: Of the six areas inspected, one apparent item of noncompliance was found in one area (infraction - failure to follow procedures for control of special processes - paragraph 8.b).

DETAILS1. Persons ContactedPrincipal Licensee Employees

*F. D. Asbeck, Construction Supervisor
 *W. H. Phillips, Project QA Manager
 *S. A. Viaclovsky, QA Supervisor
 *T. K. Logan, Lead Engineer
 *L. D. Wilson, Lead Specialist
 *M. H. Smith, Electrical QA Specialist
 D. G. Long, QA Engineer

Other Personnel

*C. L. Crane, Project Manager, Brown & Root (B&R)
 *T. H. Gamon, QA Manager, B&R
 *T. P. Gardner, Project QA Manager, B&R
 *C. W. Vincent, Quality Assurance, B&R
 R. W. Peverly, Assistant Engineering Project Manager, B&R
 D. A. Robertson, Senior Geotechnical Field Engineer, B&R
 P. A. Coster, Welding Engineer, B&R
 T. J. Foley, Site QA Manager, Pittsburgh-Des Moines Steel Company
 V. E. Sendukas, Foundation Verification and Site Geotechnical Engineer,
 Woodward-Clyde Consultants

The IE inspectors also interviewed other licensee and contractor personnel including members of the QA/QC and engineering staffs.

*denotes those attending the exit interview.

2. Licensee Action on Previous Inspection Findings

(Open) Unresolved Item (50-498/78-03-1; 50-499/78-03-1): Ultrasonic Testing of welds. The IE inspector was informed that approximately 100 NSSS support components on site remain in a "hold" status pending resolution of questions related to weld material and ultrasonic testing of welds. Three lateral steam generator supports which had apparent rejectable UT indications, that were found by the licensee, have been returned to the manufacturer for further evaluation. Westinghouse is currently reviewing these matters and will provide recommendations to the licensee. The IE inspector was also informed that the ultrasonic test, indicated on Revision 5 of Drawing 1459F31, was intended only for verification of the base material, not for examination of fillet welds; but supporting documentation was not available at the site.

This item will remain open.

(Open) Unresolved Item (50-498/78-03-2; 50-499/78-03-2): Documentation Packages for Class IE Electrical Cable. The IE inspector observed that action to resolve this item was in progress. Proposed corrective action includes clarification of the use of Form 200.59 and training sessions for personnel who use the form.

This item will remain open.

3. Site Tour

The IE inspectors walked through various areas of the site to observe construction activities in progress and to inspect house-keeping and equipment storage.

No items of noncompliance or deviations were identified.

4. Brown & Root Site QA/QC Organization

Brown & Root is implementing a plan for restructuring their site QA/QC organization. A new Site QA Manager will be assigned, effective April 1, 1978, and has already assumed an active role in developing organizational and QA Manual changes.

The new site organization under the Site QA Manager basically consists of three sections: QA, QC and Turnover; each under separate supervisors. Site QC, under the QC Supervisor, will retain responsibility for inspection of receiving, civil, mechanical and electrical activities. QA activities, under the QA Supervisor, will be expanded to include calibration (formerly under QC), external surveillance, a quality engineer group, Level III specialists, the librarian and a nonconformance supervisor. The Turnover Supervisor will be responsible for documentation (formerly under the old QA Office Manager) and turnover activities.

It is anticipated that the QA/QC staffing level will be increased from approximately 101 to 136 positions.

No items of noncompliance or deviations were identified.

5. Brown & Root Procedure Revisions

Brown & Root is currently reviewing and revising all QA/QC procedures to replace the existing multiplicity of closely interrelated procedures with a smaller number of independent procedures which will be easier to implement by site personnel.

B&R is combining site QC and construction procedures for each major activity into a single comprehensive procedure which specifies both the construction and QC requirements for that activity. These new procedures, called "Quality Construction Procedures" (QCPs), will be approved by both construction and QA. Two new requirements which will be introduced are the "Site QC Plan" which identifies what is to be inspected and the "Site QC Schedule" which specifies the frequency of inspection.

QA procedures will remain separate from QC and Construction. B&R intends to eliminate all of the previously issued QAIs and QCIs.

Brown & Root anticipates that all revised procedures will be issued by April 30, 1978.

No items of noncompliance or deviations were identified.

6. Concrete

a. Containment - Observation of Work - Unit No. 1

The IE inspector observed activities related to concrete wall placement No. CA1-W7 for the containment main access. Specifically observed were:

Preplacement

Quantity and location of reinforcing

Cleanliness

Form Integrity

Pour Card Sign-off

Placement

Consolidation

QC Inspection

Concrete Testing

Batch Plant Activities

Post Placement

Curing

The activities observed were found to be in accordance with Brown & Root Specification CS028-E, "Concrete Construction," and Drawing 1-C-1012-6.

No items of noncompliance or deviations were identified.

b. Mechanical and Electrical Auxiliary Building Unit No. 1

During a tour of the Mechanical and Electrical Auxiliary Building, the IE inspector observed several thin walls (width approximately 12 inches) with large, chipped out voids at the bottoms. Review of four DDRs (Deficiency and Disposition Report) and seven FREAs (Field Request for Engineering Action) from September 1977, which dealt with rock pockets, voids and lack of consolidation in concrete, indicated a problem with placing concrete in thin and congested walls. The licensee has recently initiated an evaluation to determine and eliminate the cause of the rock pockets, voids and lack of consolidation.

No items of noncompliance or deviations were identified.

c. Fuel Handling Building - Unit No. 2

The IE inspector observed preplacement activities for wall placement No. FH2-W11B. Specifically reviewed were vertical reinforcing steel and wall penetrations by count and approximate locations. Reinforcing and penetrations were found to be in accordance with Drawings 2-C-3001-4 and 2-C-3013-4 and Specification CS028-E.

No items of noncompliance or deviations were identified.

7. Structural Steel - Unit No. 1

The IE inspector selected four structural steel bolted joints in the Fuel Handling Building to verify inspection records. The joints selected included three column splices at elevation +36 ft. and one joint at elevation +12 ft. which had been marked as inspected. The records reviewed included the Final Inspection Report and the marked up prints. Work and records reviewed were found to be in accordance with Procedures QCP-4.5, "Structural Steel Erection," and CCP-17, "Erection of Category I Structural Steel."

No items of noncompliance or deviations were identified.

8. Containment Liner - Unit No. 2a. Records Review

The IE inspector selectively reviewed the installation and receiving records for containment liner penetration sub-assemblies 62RR1 and 66RR1.

The material certifications were reviewed for compliance with Specifications SA 516, Grade 60 of ASME B&PV Code, Section II, Part A for penetration material and SFA 5.1, Type E7018 of ASME B&PV Code, Section II, Part C for welding material.

The inspection and heat treatment records of the fabricated penetration subassemblies were reviewed for compliance with ASME B&PV Code, Section III, Division 1, Subsection NE requirements.

The installation welds of the penetrations into the liner were identified as weld seams 2 and 5 on Drawing E7AF/C. The weld history records for seams 2 and 5 were reviewed for confirmation that personnel and procedures used for welding were qualified to ASME, Section IX; electrode used for welding was certified to ASME, Section II, Part C; and inspection complied with ASME, Section V.

No items of noncompliance or deviations were identified.

b. Observation of Work

The IE inspector observed the fit-up and initial welding of seam 95 (identified on Drawing E6BE, Revision B) as a segment of the horizontal butt weld connecting liner ring No. 6 to liner ring No. 7.

The IE inspector noted that seam 95 had been only partially prepared for welding, but the fabrication checklist (FCL 2TH-17.0) had been signed off as being complete. An immediate stop-work order was issued by PDM QA personnel. A corrective action report (CAR No. 15840) was issued by PDM to document the problem. The incompleted area of the seam was then prepared for welding and inspected. Subsequently, the entire girth seam for shell ring 6-7 was reviewed by PDM QA personnel to assure that other seams had not been improperly signed off.

To prevent recurrence of the noncompliance, PDM held a training session for all their QA personnel on the joint preparation and assembly requirements of Procedures W.S.13, Section 10.0 and CVT-01/C, Section 5.0 and sign off requirements of PDM Corporate Field QA Manual, Section 4.0, paragraph 4.3.6.

The IE inspector reviewed the above corrective actions and training documentation prior to completion of the inspection and considers the action taken to be sufficient to resolve the problem and prevent recurrence.

9. Welding Material Control

The IE inspector reviewed Brown & Root Procedure WCP-1, Revision 3 and Pittsburgh-Des Moines Quality Assurance Manual for welding material control and interviewed the attendants at each rod issue station. The welding material storage, conditioning, segregation, issue, and handling of returned electrode were observed at each issue station for compliance with the procedures.

No items of noncompliance or deviations were identified.

10. Foundation Verification^{1/}

The IE inspector discussed the foundation verification results for Units 1 and 2 with the Brown & Root Resident Geotechnical Engineer.

The purpose of the foundation verification program is to confirm that actual geologic conditions encountered upon excavation are consistent with those presented in the Preliminary Safety Analysis Report. In addition, foundation verification provides documentation of soil classification and consistency such that design recommendations are assured.

The Brown & Root Engineer identified two instances which required engineering evaluation.

In Unit 1, a condition was identified in which the in-situ densities of the subgrade material were less than those expected. Correction of this problem was performed with the Vibroflotation compaction technique.^{2/}

During the excavation for the Unit 2 foundation, a clay lens was encountered within the founding "E" layer sands. A review conducted of the documentation of the foundation verification performed for the Unit 2 Containment Building indicated the actions that were taken to describe and correct the problem. The clay was located in approximately fifty percent of the area of the southeast quadrant of the excavation and ten percent of the area of the northeast quadrant.

^{1/}This portion of the inspection was performed under the direction of the principal inspector.

^{2/}IE Inspection Report No. 50-498/76-02; 50-499/76-02.

These areas are identified as Zones 249, 250 and 251 in the geotechnical consultant's "Foundation Conditions Evaluation Form" reports which were reviewed by the IE inspector along with the Brown & Root "Field Request for Engineering Action" number 2-C-0241. The original thickness of the clay lens was about seven feet with approximately four feet remaining below the design excavation bottom of the tendon gallery (elev. -40 MSL). The containment structures were designed to be founded on the "E" layer material which is described in the PSAR as being dense to very dense fine sand, slightly silty or SP-SM according to the Unified Soil Classification System. The clay lens was of the CH-CL type with the same properties as the "D" layer (modulus of elasticity of 530,000 pounds per square foot and a Poisson's ratio of 0.40). Two inspection trenches dug towards the center of the containment revealed that the clay tapered off within a short distance inside the top of the excavation slope for the tendon gallery. At no point did the clay extend inwards more than ten feet from the slope. The typical thickness of the clay at this section was two feet. The details of the distribution of the different soil types have been recorded by the geotechnical consultants on their "Sketch of Conditions in Zones" which were also reviewed by the IE inspector.

An engineering disposition directed the field to remove all clay under the tendon gallery as this soil will be subject to the peak stresses under the periphery of the containment foundation. The possible local settlements were estimated to be 0.2 to 0.3 inches if the clay had been left in place. It was further decided to leave the clay within the tendon gallery slope area, as consolidation of this clay would be insignificant. The settlement of the two feet of clay having the same properties as the "D" layer was calculated to be 0.1 inch. However, the actual settlement was deemed to be significantly less than 0.1 inch because: (1) the clay has only two feet of homogeneous thickness for small areas; (2) the rigidity of the surrounding sand will reduce any tendency for local settlement; and (3) the value for the modulus of elasticity used in the settlement calculation is conservative due to the fact that it is computed using the maximum expected value of Poisson's ratio.

The "E" layer sands exposed by removal of the clay in Zones 249, 250 and 251 were compacted with a vibratory roller. The inspector reviewed documentation of test results which indicated field densities greater than the required 98 pounds per cubic foot. The removed areas and the inspection trenches were backfilled with

concrete of design mix E-2-3-01 having a required 28 day compressive strength of 2000 pounds per square inch. The inspector reviewed the concrete cylinder test results which indicated attainment of the strength requirement on the seventh day.

No items of noncompliance or deviations were identified.

11. Geotechnical Instrumentation^{3/}

The IE inspector discussed the geotechnical instrumentation monitoring program with the Brown & Root Resident Geotechnical Engineer. The instrumentation includes twelve Sonde Extensometers, eighteen Borehole Heave Points, thirty-six Plant Area Standpipe Piezometers, thirty-four regional Standpipe Piezometers and thirty-one Pore Pressure Cells.

Sonde Extensometers (Sondex) provide measurements of heave and consolidation within the foundation supporting stratification to a maximum depth of about 3000 feet below natural ground surface. Six Sondex are read weekly and six are read bi-weekly. Borehole Heave Points also provide information on the amount of heave due to excavation unloading and subsequent settlement due to placement of structural backfill and construction of the structures. Nine Borehole Heave Points (BHPs) are read weekly, seven are read bi-weekly and two are read monthly.

The Standpipe Piezometers allow observation of the piezometric elevations within the strata of granular material underlying the site. They are used to monitor regional variations in the groundwater conditions, to monitor the groundwater control by the dewatering system and to monitor changes in piezometric pressures due to the excavation, backfill and construction. All plant area piezometers are read weekly as are seventeen of the regionally located piezometers. The rest of the piezometers are read monthly. Pore Pressure Cells are used to record pore water pressure within the soil-strata and backfill below the plant structures during the construction period. All pore pressure cells are read weekly.

Along with the instruments listed above, benchmarks are also used for periodic checking of elevations by surveying.

^{3/}This portion of the inspection was performed under the direction of the principal inspector.

The IE inspector reviewed the Brown & Root Quality Assurance "Geotechnical Surveillance Plan" required for each of the listed instruments. The results of the required surveillances are documented on the "Geotechnical Surveillance Report" which were also reviewed.

No unexpected data or foundation performance anomalies were identified by the consulting Resident Geotechnical Engineer or the Brown & Root Measurements Engineer.

No items of noncompliance or deviations were identified.

12. Exit Interview

The IE inspectors met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on March 23, 1978. The inspectors summarized the pupose and the scope of the inspection and the findings. A licensee representative acknowledged the statement of the inspector concerning the item of noncompliance (paragraph 8).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)	
)	
HOUSTON LIGHTING AND POWER COMPANY)	Docket Nos. 50-498
(South Texas Project, Units 1 & 2))	50-499

ORDER TO SHOW CAUSE (EFFECTIVE IMMEDIATELY)

I

The Houston Lighting and Power Company is the holder of Construction Permit Nos. CPPR-128 and CPPR-129, issued on December 25, 1975. These permits authorize, in accordance with their provisions, construction of the South Texas Project, Units 1 and 2, in Matagorda County, Texas.

II

As a result of allegations that QC inspectors were being threatened if they identified unacceptable items during concrete placements, an investigation (Report No. 50-498/77-08; 50-499/77-08) was conducted by the NRC Region IV (Arlington, Texas) Office during July 1977. Ten QC inspectors were interviewed, six stated they had experienced some harassment, but none stated that the harassment led to overlooking unacceptable items. In December 1977, an investigation (Report No. 50-498/77-14; 50-499/77-14) of an allegation that certain radiographs, mailed to a concerned citizen, revealed faulty welds, was not substantiated as the allegor was apparently the victim of a hoax. In March 1978, an investigation (Report No. 50-498/78-05; 50-499/78-05) was conducted of an allegation from an individual who felt he would become a potential

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scapegoat for allowing the improper use of procedures; this allegation was not substantiated. In May 1978, an investigation (Report No. 50-498/78-09; 50-499/78-09) was conducted of allegations made by an anonymous individual that Cadweld records involving qualifications of QC inspectors were being falsified and QC inspectors were under pressure to violate inspection procedures and, thereby, not hold up construction work. There was no evidence that Cadweld records had been falsified. Interviews with QC inspectors indicated that while there was normal pressure to get the job done there was no undue pressure to violate procedures. One QC supervisor stated that his "holds" (inspection hold points) had sometimes been overruled by higher authority, but he stated this was management's prerogative and did not result from construction pressure. In July 1978, an investigation (Report No. 50-498/78-12; 50-499/78-12) was conducted of allegations made by an individual that QC Civil inspectors were inadequately trained on new procedures; the nonconformance reporting system was inadequate; QC inspectors were not given adequate support; upper management was inaccessible; and construction personnel placed undue pressure on QC inspectors. The allegations, for the most part, could not be substantiated. The investigation results did indicate apparent low morale of some QA/QC Civil inspectors and some weaknesses in the Civil QA program.

In early August 1978, Region IV rereviewed the results of the past several investigations and noted that although most of the allegations were not substantiated, low morale of QC personnel was certainly evident during the investigations. This observation prompted Region IV management to conduct a

special meeting with licensee's corporate management representatives in their corporate offices in Houston, Texas, on August 15, 1978 (Report No. 50-498/78-13; 50-499/78-13). The specific purpose of the meeting was not only to express concern about the apparent low morale of some Civil QA/QC personnel, but also to discuss apparent weaknesses in the implementation of the site QA/QC Civil program, and the adequacy of the present QA/QC staffing level. Region IV concluded the meeting by stating that although they recognized that most of the items discussed were based on allegations which were not substantiated, there was concern about certain perceived indications. Specifically, there appeared to be a morale problem in the site Civil QA/QC organization; the long QC inspector punch lists would suggest that the construction surveillance inspections by the craft foremen and field engineers were less than adequate and, thereby, placing additional pressures on QC inspectors to complete final inspections; the observations made by Region IV inspectors that Civil QC inspectors appeared to spend very little time at their desk preparing for inspections could suggest that QC inspectors have too heavy an inspection workload; finally, with regard to the adequacy of staffing concern was expressed that the staffing plan for the current status of the project indicated that the site was below the specified QA/QC manpower level by some 21 Brown and Root personnel and by some 2 licensee personnel.

One month later, on September 15, 1978, a meeting was held in the Region IV office with licensee and Brown and Root management to further discuss commitments made by the licensee during the August 15, 1978, meeting in Houston:

Also discussed during the meeting were findings identified during the September 11-14, 1978, Region IV investigation of Cadweld irregularities which resulted in the issuance of an Immediate Action Letter on September 14, 1978, confirming a licensee imposed stop work order on placement of concrete in the Unit 1 Reactor Containment Building. The September 15 meeting was followed by a licensee letter dated October 3, 1978 to the Region IV office which addressed the several allegations that were the subject of the July 1978 Region IV investigation that led to the special meeting with the licensee on August 15, 1978. The actions committed to by the licensee, as set forth in the October 3 letter, to correct the apparent low morale problem and strengthen the QA/QC program were included in the inspection agenda for forthcoming Region IV inspections. The results of Region IV inspections conducted during the next several months indicated that actions were being taken by the licensee to strengthen the onsite QA/QC program and improve the morale of site QC inspectors.

Region IV continued to receive allegations which were primarily directed toward site QA/QC activities. During the period August 1978 to November 1979, five investigations were conducted by Region IV. In August 1978, an investigation (Report No. 50-498/78-14; 50-499/78-14) was conducted of an alleged solicitation of bribes by a former QC inspector. The allegation, involving one man's word against another, was not substantiated. An additional allegation revealed during the investigation that QC inspectors would be adversely affected by the termination of the former QC inspector was not substantiated.

In September 1978, an investigation (Report No. 50-498/78-15; 50-499/78-15) was conducted of allegations made by a QC inspector involving installation and inspection of Cadwelds, mislocation of a Unit 2 structure and the inability of some construction foremen to read and write. Four of the thirteen allegations were substantiated, resulting in two items of noncompliance. Allegations that were substantiated included the loss of a field sketch, application of centering marks to rebar after Cadwelds were completed, lack of second shift QC inspector coverage for Cadwelding, and that only three Cadweld QC inspectors were available for Cadweld inspection. The allegation concerning mislocation of a Unit 2 structure was, in fact, a survey error which resulted in the Mechanical/Electrical Auxiliary Building concrete mat being one foot too narrow. This item had already been identified by the licensee.

In January and February 1979, an investigation (Report No. 50-498/79-01; 50-499/79-01) was conducted of allegations made by a former employee concerning installation and inspection of Cadwelds. Two of the six allegations were substantiated resulting in one item of noncompliance. Allegations that were substantiated included the copying over of dirty Cadweld Examination Checklists and entering the QC inspector's initials on the clean checklists by another person; and the acceptance of a Cadweld with excess voids in the filler metal. In May 1979, an investigation (Report No. 50-498/79-09; 50-499/79-09) was conducted of allegations concerning refusal of a QC inspector to sign a concrete pour card and widespread discrepancies in the Cadweld "as-built" location records. Both allegations were substantiated, but no items of noncompliance were identified. In September 1979, an investigation (Report No. 50-498/79-14; 50-499/79-14) was conducted of alleged intimidation of QC inspectors

by construction personnel and QA/QC program irregularities. Four of the ten allegations were substantiated resulting in an item of noncompliance and a deviation. Allegations that were substantiated, included the finding that holes were, in fact, left in walls of safety-related structures after removal of form ties; Lift 5 of the Unit 2 Reactor Containment Building contained Cadwelds that were not accounted for; an inspection report contained an unsigned and undated entry by a person other than the QC inspector; and a QC inspector was verbally instructed to disregard a stopwork notice.

In addition to the several investigations of allegations, an investigation of an altercation between a construction engineer and a QC inspector was conducted in May 1979, and was documented in Inspection Report No. 50-498/79-04; 50-499/79-04. The incident was confirmed, but licensee actions were considered appropriate and no items of noncompliance were identified.

Significant civil/structural problems identified and reported to Region IV by the licensee during 1978 and 1979, in accordance with 10 CFR Part 50.55(e), included unconsolidated concrete in the slab under the spent fuel pool in the Unit 1 Fuel Handling Building; a dimensional error in the base mat of the Unit 2 Mechanical/Electrical Auxiliary Building (MEAB2); placement of Category I backfill over a clay ramp in the MEAB2 area; concrete voids behind the liner plate in Lift 15 of the Unit 1 Reactor Containment Building (RCB) exterior

wall; and concrete voids in lift 8 of the Unit 1 RCB wall. The voids in Lift 8 and later in other areas of the Units 1 and 2 RCB exterior walls were identified by the licensee as a result of Region IV concerns which were expressed following the discovery of the voids in Lift 15 of the Unit 1 RCB.

Region IV issued five Immediate Action Letters (IAL) to the licensee during the period January 1978 to November 1979. An IAL confirming a licensee imposed stopwork order on concrete placement in the RCB1 was issued in September 1978. The stop work resulted from problems concerning installation and inspection of Cadwelds identified during the investigation conducted in September 1978. An IAL concerning improper storage of reinforcing steel was issued in April 1979. The IAL was the result of reinforcing steel storage discrepancies identified during an inspection (Report No. 50-498/79-05; 50-499/79-05) conducted in April 1979. An IAL confirming a licensee imposed stopwork order related to placement of safety-related concrete was issued in June 1979. The stopwork order was the result of the discovery of concrete voids in Lift 8 of the Unit 1 RCB. Another IAL was issued in June 1979 which confirmed the partial release of the stopwork order for safety-related concrete but continued the stop work for RCB exterior shell wall placements. An IAL issued in September 1979 involved release of the stopwork order affecting RCB shell wall placements.

In addition to the ten investigations performed during the July 1977 to November 1979 period, a special Mid-Team QA inspection (Report No. 50-498/79-13; 50-499/79-13) was conducted during the week of August 6, 1979, on an

accelerated schedule. NRC participants in the inspection included two Region IV inspectors, the RRI designee from Region III, and an Inspection Specialist from Region II. Five items of noncompliance related to QA program implementation were identified during the inspection.

A Reactor Resident Inspector (RRI) was assigned to the South Texas Project on August 26, 1979, and assumed resident duties on September 2, 1979. On November 2, 1979, the RRI was contacted on site by a Brown and Root QC inspector who alleged that civil QC inspectors were being harassed and intimidated by Brown and Root construction personnel.

III

As a result of the allegations received on November 2, 1979, past allegations of a similar nature and repeated failures on the part of both HL&P and B&R to effectively correct poor construction practices, a special investigation effort was initiated. The purpose of this investigation effort, conducted over the period of November 10, 1979 to February 7, 1980, was to determine the validity of the recent allegations and to assess the effectiveness of the Quality Assurance/Quality Control (QA/QC) program at the South Texas Project (STP). The investigation team reporting directly to the HQ staff was comprised of an investigator and one inspector from the Region IV, one inspector each from the Region I and II offices and two from the Region III office.

The details of these findings are described in the investigation report No. 50-498/79-19 and 50-499/79-19. The items of noncompliance resulting from the special investigation are described in Appendix A of the transmittal letter of this Order.

The allegations of harassment, intimidation and lack of support of QC inspectors were substantiated during the investigation and demonstrate shortcomings in the management or poor management attitude and practices at the STP. Further, the results of the investigation establish that the QA/QC program at the South Texas Project is deficient and does not meet the standards required to assure that STP will be constructed to NRC requirements.

Procedural and programmatic inadequacies in the HL&P and B&R organization have resulted in a failure to identify quality problems and a failure to correct and prevent recurrence of identified problems. The lack of adequate control by B&R over safety-related activities and the lack of detailed involvement of HL&P in the total scope of activities associated with the STP has apparently been the reason behind these problems. This lack of detailed knowledge and involvement has hindered HL&P's ability to maintain adequate control of B&R, which for this facility is designer, constructor and provides the majority of the support personnel for the quality assurance/quality control program.

The South Texas Project QA management does not fully recognize the requirement for QA/QC organizational freedom. This is evidenced by a January 4, 1980 lecture by the B&R Project QA manager to the B&R site QA/QC and construction

and engineering supervisory personnel. This lecture which has not yet been revised repeatedly overemphasized the B&R QA/QC organization's responsibilities for minimizing project cost and maintaining the construction schedule. In addition, the lecture stressed the fact that a B&R QC inspector's decisions are subject to question, challenge and supervisory review and reversal.

The inspection of current activities and recent QA records indicate that the QA/QC program has not prevented recurrence of poor concreting practices that at times resulted in voids in structural concrete. A recent example of this was the lack of quality controls during the Unit 2 containment shell void evaluation in December 1979, which resulted in severe deformation of the containment liner.

Procedures lacking in clarity and qualitative acceptance criteria; personnel with inadequate training, experience and/or education; and production and scheduling pressures, harassment and intimidation may have contributed to this situation.

In the area of soil foundations, serious questions remain as to whether the in-place compacted backfill has met the required densities. When the licensee recently initiated a test program to provide answers to these questions, the QA/QC program failed to adequately review and control this operation, in that standard test requirements were not followed.

Although safety-related pipe welding activities are at an early stage at the STP, serious problems were identified in the areas of welder qualification, welding process controls and NDE performance and interpretation.

Improper implementation of the HL&P and B&R QA audits and surveillance programs and failure to perform continuous and effective trend analysis of site documents that record problem areas have allowed these conditions to persist.

During the review of backfill installation and testing activities two apparent false statements in the FSAR were identified regarding test and observation work actually performed. (Sections 2.5.4.5.6.2.4 and 2.5.4.5.6.2.5)

At the present time work involving complex safety-related concrete placement at the site is stopped as confirmed by an Immediate Action Letter from Region IV dated December 31, 1979 and safety related welding is stopped at the site as confirmed by an Immediate Action Letter from Region IV dated April 17, 1980. Potential for future significant construction deficiencies exist if the quality assurance program is not improved prior to proceeding to the more complex construction stages of this project.

IV

The facts set forth in parts II and III, above, reflect widespread noncompliance by the licensee and its principal contractor, Brown and Root, with 10 CFR Part 50, Appendix B, of the Commission's regulations. In view of this past record and the importance of quality assurance during construction of a nuclear power plant,

I have determined that the public health, safety, and interest requires that this Order be temporarily effective as of this date, pending further Order of the Commission.

V

A. Accordingly, pursuant to the Atomic Energy Act of 1954, as amended, and the Commission's regulations in 10 CFR Parts 2 and 50, IT IS HEREBY ORDERED THAT, the licensee, holder of Construction Permits No. CPPR-128 and No. CPPR-129, shall show cause, in the manner hereinafter provided, why safety-related construction activities on the South Texas Project, Units 1 and 2 should not be stopped ninety (90) days from the date of this Order and remain stopped until such time as the licensee completes the following items and submits in writing under oath to the Director, Office of Inspection and Enforcement information addressing each of the items:

- (1) A review shall be conducted by an experienced, independent management consultant, knowledgeable in QA/QC and nuclear construction, of the licensee's management of the quality assurance program to determine whether the management of the program is adequate to exercise full control over all aspects of the South Texas Project. Consideration shall be given to the revision of organizational responsibilities to control the design, procurement and construction

activities of the licensee's prime contractor, Brown and Root, Incorporated (B&R). A discussion of the pros and cons of each concept shall be included. The alternatives considered shall include as a minimum:

- (a) the present organizational structure where B&R has implemented a Quality Assurance/Control (QA/QC) Program, under the licensee,
- (b) an organizational structure where all levels of the B&R QA/QC organization would report to the licensee yet remain B&R employees,
- (c) an organizational structure where the licensee establishes a total QA/QC organization to conduct the current B&R QA/QC functions,
- (d) an organizational structure where the licensee contracts with another independent organization to perform the current B&R QA/QC functions,
- (e) an organizational structure where the licensee establishes a duplicate QA/QC organization, in whole or in part, to that of B&R with both groups performing duplicate functions.

A recommended course of action shall be defined by the licensee including the schedule for implementation. In evaluating the recommendations of the consultant in order to select the best concept, the licensee shall provide information on how it will exercise its overall responsibility for the QA/QC program including the management structure, the degree of involvement, qualifications, staff size, training, and experience. Of particular interest are the frequency and depth of participation of upper and middle management to assure that knowledge of the effectiveness of the QA/QC program is current, that such persons take the necessary actions to verify that the various QA staffs are effectively applying good QA controls, and that all personnel have the proper attitude and are applying the necessary attention to detail.

- (2) A review shall be completed or new data obtained to provide information to address the following issues with respect to the Category I structural backfill:
 - (a) test fill program which established the soil conditions, lift thickness, compactive effort, and equipment characteristics necessary to develop the necessary in-place densities,
 - (b) comparison of material(s) tested and described in Section 2.5.4.8.3 of FSAR addressing liquefaction with those used in the field,

- (c) the sequence of construction of existing backfill including the loose lift thickness and number of passes of the equipment,
 - (d) the adequacy of existing backfill material including that under structures founded on backfill,
 - (e) and the rationale behind the use of 18" loose lifts compacted by 8 passes of the equipment to achieve the required densities.
- (3) A review shall be made of the safety-related work described below, completed as of the date of this Order to determine whether such work was properly performed. If repairs are required, describe the extent of the repairs necessary and the schedule for completion.

Also describe the manner in which the review was completed and extent of the review.

- (a) Safety-related welding including civil-structural and piping.
 - (b) Safety-related concrete structures including embedments such as supports and the fuel transfer tube.
- (4) The licensee shall cause the Brown and Root, Incorporated brochure titled, "Implementation of the Brown and Root Quality Assurance Program at the South Texas Project Jobsite," which was widely

distributed to site personnel and the subject of seminars on January 4, 1980, rescinded and the associated video tape to be destroyed or revised. Further, the licensee shall cause the republication of a new QA Program brochure which has been approved by the licensee which reflects the fundamental philosophies of 10 CFR Part 50, Appendix B, and conduct new seminars with Construction and QC personnel on the fundamental philosophies and standards of the licensee's QA Program with emphasis on the roles played by the respective personnel and the underlying purpose of the Program.

- (5) The licensee shall define more clearly the stop work authority, temporary or otherwise, including implementation of the stop work authority.
- (6) The licensee shall develop and implement a more effective system to provide for the identification and correction of the root causes of the nonconformances which occur.
- (7) The licensee shall develop and implement a more effective system to provide for the control of field changes in order to assess the impact of the design changes on the design.
- (8) The licensee shall develop and implement a more effective system of record controls.

- (9) The licensee shall develop and implement an improved audit system.
- (10) The licensee shall 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.
- B. In addition, pursuant to the Atomic Energy Act of 1954, as amended, and the Commission's regulations in 10 CFR Parts 2 and 50, IT IS HEREBY ORDERED THAT:
- After the responses to Section A above have been submitted, the licensee shall participate in a public meeting with the NRC in a location near the South Texas Project site to discuss the licensee's response to that section of the Order. Senior representatives of Brown and Root will be expected to participate. The Director, Region IV, will inform the licensee and members of the public at least two weeks in advance of the specific time and location of the meeting.
- C. The Director, Office of Inspection and Enforcement, will review the responses to Section A, above, to determine whether safety related construction will be conducted in accordance with Appendix B of 10 CFR Part 50 of the Commission's regulations, and may take, as appropriate, further action.

VI

The licensee may file a written answer to this Order under oath or affirmation within twenty-five days of the date of this Order. Any answer filed shall specifically admit or deny each allegation made in Section II and III, above, and may set forth the matter of fact and law upon which the licensee relies. The licensee or any other person whose interest may be affected by this Order may request a hearing within twenty-five days of this Order. Any request for a hearing shall be addressed to the Director, Office of Inspection and Enforcement, U. S. Nuclear Regulatory Commission, Washington, D. C., 20555, with a copy to the Executive Legal Director at the same address. If a hearing is requested by a person whose interest may be affected by this Order, the Commission will issue an Order designating the time and place of any such hearing. Such a request for a hearing SHALL NOT STAY THE TEMPORARY EFFECTIVENESS OF THIS ORDER. Upon failure of the licensee to file an answer within the time specified, the Director, Office of Inspection and Enforcement, will without further notice, issue an Order Suspending Construction Permit Nos. CPPR-128 and CPPR-129 if the required actions are not taken in the specified time period.

VII

In the event a hearing is held, the issue to be considered at such hearing shall be:

whether the licensee shall be required to take the actions specified in Section V(A), above, within 90 days of the date of this Order.

In the event that a need for further enforcement action becomes apparent, either in the course of the hearing or at any other time, appropriate action will be taken by the Director.

FOR THE NUCLEAR REGULATORY COMMISSION

Victor Stello, Jr.
Director
Office of Inspection
and Enforcement

Dated at Bethesda, Maryland
this _____ day of _____, 1980