

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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In the Matter of )  
 )  
HOUSTON LIGHTING AND POWER COMPANY )  
(South Texas Project, Units 1 & 2) )

Docket Nos. 50-498  
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 alleged 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

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 inplace 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.

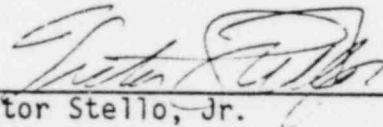
VII

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



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Victor Stello, Jr.  
Director  
Office of Inspection  
and Enforcement

Dated at Bethesda, Maryland,  
this 30th day of April, 1980