

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

Report No. 50-498/78-15; 50-499/78-15

Docket No. 50-498; 50-499

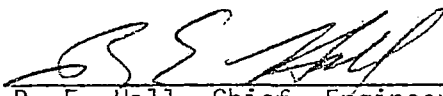
Category A2

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


Facility Name: South Texas Project, Units 1 and 2

Investigation at: South Texas Project, Matagorda County, Texas


Investigation conducted: September 11-14, 1978

Inspectors:   
R. E. Hall, Chief, Engineering Support Section

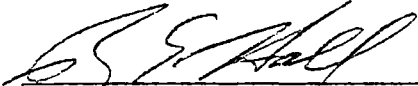
10/6/78  
Date

  
A. B. Rosenberg, Reactor Inspector, Engineering Support Section

10/6/78  
Date

Reviewed:   
W. G. Hubacek, Reactor Inspector, Projects Section

10/6/78  
Date

Approved:   
R. E. Hall, Chief, Engineering Support Section

10/6/78  
Date

Investigation Summary:

Investigation on September 11-14, 1978 (Report No. 50-498/78-15; 50-499/78-15)

Areas Inspected: Special, unannounced investigation of allegations regarding nonconforming construction practices and insufficient quality control programs involved in Unit 1 construction; and a mislocation of the Unit 2 structure. The investigation involved fifty-two inspector-hours by two NRC inspectors;

Results: Investigation of the allegations resulted in two identified items of noncompliance (infraction - failure to follow Cadweld procedure - paragraph 2.h; and infraction - failure to provide specified in-process inspection - paragraph 2.i).

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## INTRODUCTION

The South Texas Project, Units No. 1 and 2, are under construction in Matagorda County, Texas near the town of Wadsworth, Texas. Houston Lighting and Power Company is the Construction Permit holder. Brown and Root, Incorporated is both Architect Engineer and Constructor for the plant.

## REASON FOR INVESTIGATION

The Region IV duty officer received a telephone call on September 9, 1978, from an STP employee who reported specific allegations regarding the STP Civil Construction and Quality Assurance programs.

## SUMMARY OF FACTS

On September 9, 1978, the Region IV duty officer (Chief, Projects Section, Reactor Construction Branch) received a telephone call from an individual who identified himself as an employee at the South Texas Project. The employee wished to report irregularities in the Civil Construction and Quality Assurance programs at South Texas. The individual expressed the following specific allegations relating to the South Texas construction and Quality Assurance programs:

1. Cadweld location field sketch No. FSQ030 had been lost and was no longer available.
2. Two construction field sketches showing Cadweld locations, FSQ040 and FSQ041, contain Cadweld locations showing shot number and elevation but no coordinate number, or showing shot number and coordinate number but no elevation.
3. Excessive time of up to six weeks is taken to record shot numbers for Cadwelds on as-built drawings.
4. Cadweld locations are recorded by Construction rather than by Quality Control personnel.
5. Cadweld location field sketch FSQ034 shows Cadwelds at the wrong elevation and horizontally displaced by one rebar from actual installation.

6. Construction Site Procedure CCP-11 (Brown & Root Quality Construction Procedure A040KPCCP-11) prohibits Cadwelder helpers from heating and cleaning bar ends preparatory to Cadweld splicing. Construction code ACI359 (Draft Division 2, ASME Section III) paragraph CC433.3 precludes unqualified helpers from doing any activity related to Cadwelding. It was alleged that personnel classed as helpers were cleaning and heating bar ends preparatory to Cadwelding.
7. Cadweld powder lots and sleeves are not traceable to the Cadweld location drawings as shown on FSQs. Issuance of multiple lots of powder to individual Cadwelders is now permitted.
8. Centering marks on rebar are made after firing of Cadwelds in violation of Cadwelding procedures.
9. Back shift inspections of Cadwelding operations are not being made; therefore, twenty-five to thirty shots per Cadwelder are made as compared with four to five shots per Cadwelder on the day shift when QC coverage is available.
10. Only three Quality Control Civil inspectors do Cadweld inspections.
11. Brown & Root foremen can neither read nor write.
12. Cadweld operations are proceeding in wet weather in violation of procedure.
13. The Unit No. 2 Containment, the Mechanical Electrical Auxiliary, and the Fuel Handling Buildings are mislocated by one foot from the position shown on design drawings.

#### CONCLUSIONS

1. The allegation regarding the loss of field sketch FSQ030 was confirmed. Houston Lighting & Power Company has initiated action to identify the significance of the missing data and the impact upon the records required for the South Texas Project. This item has been identified as an unresolved item.
2. The allegation concerning insufficient identifiers for Cadweld locations on drawings FSQ040 and FSQ041 could not be substantiated. Records review and print review confirmed that descriptions of Cadweld locations were sufficient to specifically identify Cadweld locations.

3. The allegation regarding excessive time to record data on as-built drawings could not be substantiated. Cadweld locations for an in-process placement were reviewed and found to be complete and sufficient to support that concrete placement.
4. The allegation regarding use of Construction personnel instead of Quality Control personnel to record Cadweld locations could neither be proven nor disproven since all data sheets reviewed had been completed by Quality Control personnel.
5. The allegation concerning mislocation of Cadwelds on FSQ034 was not substantiated. Physical inspection of Cadweld location revealed that installed Cadwelds were in agreement with record copies of FSQ034 within specified construction tolerances.
6. The allegation regarding helpers performing activities in nonconformance with established procedures could not be substantiated. Procedures in use and regulatory requirements do not preclude helpers from cleaning and heating bar ends preparatory to Cadweld firing.
7. The allegation regarding loss of traceability of Cadweld powder and sleeve lots as a result of a procedure change could not be substantiated. Records are maintained of lot numbers and sleeve numbers utilized in each Cadweld. It was confirmed that a procedure change had been recently made which permitted issuance of multiple lots of material to a given Cadwelder; however, this is not inconsistent with applicable regulatory requirements.
8. The allegation regarding application of centering marks to rebar after firing was substantiated by direct observation. Additional cases of failure to follow procedure with respect to Cadwelding operations were also identified. This item has been identified as an item of noncompliance.
9. The allegation regarding the lack of second shift Quality Control inspection coverage of Cadwelding operations was confirmed. The alleged difference in the rate of performance of Cadwelding operations between night shift and day shift, however, could not be substantiated. Lack of second shift Quality Control inspection has been identified as an item of noncompliance.
10. The allegation regarding the fact that only three Cadweld inspectors are available for all Cadweld inspection was confirmed.
11. The allegation regarding the inability of Brown & Root foremen to read or write was not inspected during this investigation. However, the matter of alleged communication problems will continue to be the subject of forthcoming inspections.

12. The allegation that Cadweld operations are proceeding in wet weather could neither be proven or disproven since weather conditions did not permit direct inspection in this regard.
13. The allegation regarding mislocation of Unit 2 structures was found to be an item under review by the licensee. At the time of the investigation, the licensee had not determined that it was reportable in accordance with 10 CFR 50.55(e); therefore, this item was identified as an unresolved item.

## DETAILS

### 1. Persons Contacted

#### Principal Licensee Employees

- \*F. D. Asbeck, Construction Supervisor
- \*D. G. Barker, Manager, Construction
- \*R. A. Frazar, Manager, Quality Assurance
- M. M. Johnson, Senior Engineer
- \*H. L. Key, Project Manager
- D. G. Long, Lead Engineer
- \*W. M. Menger, Power Plant Engineering and Construction
- \*W. H. Morgan, Manager of Projects
- \*W. N. Phillips, Projects QA Manager
- \*T. D. Stanley, QA Supervisor
- \*S. A. Viaclovsky, Site QA Supervisor

#### Brown & Root Employees

- \*L. A. Ashley, Senior Construction Manager
- J. B. Cleere, Training Coordinator
- \*C. L. Crane, Project General Manager
- \*T. H. Gamon, Quality Assurance Manager
- B. Hearitige, Night Building Superintendent
- \*J. R. Monroe, Construction Project Manager
- \*H. Paperno, Assistant QA Manager
- \*J. Salvitti, Assistant Project Manager
- C. M. Singleton, Civil Inspector
- \*C. W. Vincent, Project QA Manager

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

\*denotes those attending the exit interview.

### 2. Investigation Details

#### a. Allegation No. 1

Cadweld location field sketch No. FSQ030 had been lost and was no longer available.

#### Findings

Cadweld location field sketch No. FSQ030 was requested from the QC records vault. It was indicated as having been issued to a Brown & Root Quality Control inspector who is no longer

assigned to the project. The title identifier assigned by the quality records section was insufficient to identify the specific location for data which were to have been recorded on this field sketch drawing. Other drawings referenced in the tabular listing of field sketches covered similar identifiers but at specified elevations. It could not be determined by the IE inspectors whether or not FSQ030 had been, in fact, utilized by Quality Control to record Cadweld locations which were not recorded on other drawings. Further search by the licensee and Brown & Root Quality Control failed to locate FSQ030. The licensee issued speed letter C047 dated September 14, 1978, requesting that Brown & Root continue their search for the missing drawing and if it could not be located, then the specific area which would have been included on that drawing be identified. It was also requested that the significance of the missing data be defined. This item is identified as an unresolved item pending completion of the research initiated by the licensee's speed letter.

This allegation was confirmed.

b. Allegation No. 2

Two construction field sketches showing Cadweld locations, FSQ040 and FSQ041, contain Cadweld locations showing shot number and elevation but no coordinate number, or showing shot number and coordinate number but no elevation.

Findings

A review of field sketch FSQ040 and field sketch FSQ041 and comparison with the Brown & Root construction drawings confirmed that the location of all identified Cadwelds could be expressly determined based on available data. In one case, it was necessary to also reference a Field Request for Engineering Action (FREA), an intermediate engineering drawing; however, utilization of the FREA and the Brown & Root construction drawing permitted specific identification of Cadweld locations.

This allegation was not substantiated.

c. Allegation No. 3

Excessive time of up to six weeks is taken to record shot numbers for Cadwelds on as-built drawings.

### Findings

Cadweld location records identified on FSQ034 and FSQ071 which were to be utilized for scheduled concrete placement CS W8A, E and G scheduled for September 13, 1978, were reviewed to determine if they had been completed in preparation for that concrete pour. It was verified that all records necessary to identify Cadweld locations within that pour had been completed on a timely basis preparatory to release by Quality Assurance of the pour card. A specific requirement of the pour card for complex placements requires that Construction, Engineering and Quality Control indicate their acceptance of Cadweld locations as specified on engineering drawings prior to release of the pour card for concrete placement.

This allegation could not be substantiated.

d. Allegation No. 4

Cadweld locations are recorded by Construction rather than by Quality Control personnel.

### Findings

This allegation could neither be proven or disproven since data were not available to indicate that Construction forces have been utilized instead of Quality Control personnel to record Cadweld locations. All data sheets reviewed had apparently been completed by Quality Control inspectors. Since these data are recorded by the inspectors as a part of their verification activities, there were no records which would substantiate the improper use of Construction personnel to do quality verifications.

e. Allegation No. 5

Cadweld location field sketch FSQ034 shows Cadwelds at the wrong elevation and horizontally displaced by one rebar from actual installation.

### Findings

This allegation can be considered in two parts:

- (1) The allegation was made that Cadwelds had been placed at a one inch elevation difference than that prescribed on drawings. It was alleged that no tolerances were specified



on the Brown & Root construction drawings. It was determined that an internal Brown & Root memorandum, GM-13351, dated July 15, 1975, had been issued previously which specified a plus or minus 3 inch tolerance on Cadweld splice location.

- (2) It was alleged that records showing Cadweld location on rebar in placement CS W8A, E and G were incorrect in that they showed the Cadwelds on the wrong reinforcing bars. Physical verification by the IE inspectors and comparison of installed Cadweld locations with formal records as shown on sketch FSQ034 confirmed that Cadweld locations were properly depicted on the field sketch.

This allegation could not be substantiated.

f. Allegation No. 6

Construction site procedure CCP-11 (Brown & Root Quality Construction Procedure A040KPCCP-11) prohibits Cadwelder helpers from heating bar ends and cleaning bar ends preparatory to Cadweld splicing. Construction code ACI359 (Draft Division 2, ASME Section III) paragraph CC433.3 precludes unqualified helpers from doing any activity related to Cadwelding. It was alleged that personnel classed as helpers were cleaning and heating bar ends preparatory to Cadwelding.

Findings

Review of Construction Quality Procedure CCP-11 and previous editions of Construction and Quality Assurance procedures covering Cadwelding operations did not identify any specific breakdown in work that could be assigned to Cadweld helpers. Review of the Erico Cadweld rebar splicing procedures indicated that, in fact, bar end preparation, cleaning and heating are not integral steps of the Cadweld procedure, but are preparatory steps. Since the qualified Cadwelder is responsible for assembly of the Cadweld and its firing, as well as final acceptance, use of helpers for preparatory steps does not appear inconsistent with procedure or with regulatory requirements.

This allegation could not be substantiated.

g. Allegation No. 7

Cadweld powder lots and sleeves are not traceable to the Cadweld location drawings as shown on FSQs. Issuance of multiple lots of powder to individual Cadwelders is not permitted.

### Findings

It was verified that Revision 4 to procedure CCP-11 dated August 25, 1978, did, in fact, delete the following from paragraph 3.6.1; "Only one sleeve lot and one filler metal lot may be issued to a Cadwelder at any given time." However, paragraph 3.6.1 still states, "traceability of Cadweld material shall be verified by QC." Review of Cadweld material issue logs revealed that normally only one lot of sleeve or cartridge material is issued to a Cadwelder at a given time; however, there have been exceptions to that practice. No such exceptions occurred during the process of this investigation; however, discussions with the Cadweld material issue clerk indicated that when a lot of material is broken, i.e., more than one lot issued to a Cadwelder at one time, the individual bags of cartridge material or sleeves are marked with their material lot number. These data may then be recorded by the Cadwelder in his log and subsequently on Cadweld record logs. All records reviewed, both Cadwelder logs and Cadweld records, confirmed that lot numbers of cartridge material and sleeve material utilized are being recorded for each fabricated Cadweld splice.

This allegation was substantiated as stated; however, since no regulatory requirement has been compromised, this item is not considered to be in deviation with NRC requirements.

#### h. Allegation No. 8

Centering marks on rebar are made after firing of Cadwelds in violation of Cadwelding procedures.

### Findings

Cadwelding operations on both the day and second shifts were observed by the IE inspectors. During observations on the second shift on September 12, 1978, the following specific deviations from Erico Cadweld procedures were noted:

- (1) Cadweld number 54-47 which had been fabricated on September 12, 1978, was observed to contain a piece of tie wire pressed into the annular gap between the rebar and Cadweld sleeve such that it concealed an unacceptable void in the filler material.

- (2) Packing wrappings being utilized for the top of the vertical Cadweld sleeves were being retained in place utilizing tie wire rather than the approved retaining clamp. This was observed for two Cadwelders (No. 54, 33).
- (3) It was observed that multiple wraps in excess of the 1-1/2 turns of packing material were being applied to the top annular area of Cadwelds being fabricated in the vertical orientation. It was subsequently determined that up to 2-1/2 turns is permissible by the Cadweld manufacturer; however, HL&P and Brown and Root procedures had not been modified to permit this increased number of wraps.
- (4) Cadweld Number 54V49 which had just been fabricated did not have witness centering marks as prescribed by procedure. Lack of these marks prior to firing makes it impossible to determine proper centering of the Cadweld sleeve on the rebar joint. A second case involving Cadwelder No. 33 was also observed in which the rebar had not been marked with centering marks prior to assembly of the Cadweld splice materials.
- (5) During fabrication of Cadweld No. 54V50, it was observed that the Cadwelder utilized a torch to fire the Cadweld rather than the prescribed Flint Gun.

This allegation was substantiated in that two instances were noted wherein centering marks had not been applied to the rebar prior to Cadweld fabrication or assembly. Additionally, other noted procedural discrepancies are considered to be an indication of failure to follow procedure. This is considered a violation of the requirements of Criterion V, Appendix B, 10 CFR 50 which requires that procedures be established and implemented for those activities affecting quality.

i. Allegation No. 9

Back shift inspections of Cadwelding operations are not being made; therefore, twenty-five to thirty shots per Cadwelder are made during the back shift as compared with four to five shots per Cadwelder on day shift when QC coverage is available.

Findings

This allegation may be considered in two parts:

- (1) The allegation that back shift inspection is not being made was substantiated. During the period when the inspectors

performed an investigation on the second shift on September 12, 1978, no Quality Control in-process inspection was observed for Cadwelding operations. Review of records and discussions with assigned Brown & Root Cadweld inspectors confirmed that during the period August 1 through September 10 essentially no second shift inspection of in-process Cadwelding operations had been performed. Appendix A to Brown & Root Quality Construction Procedure CCP-11 specifies that in-process inspection will be performed on a daily basis to inspect conformance with procedural requirements involved in Cadweld fabrication. This is considered an item of noncompliance with Criterion X, 10 CFR 50, Appendix B which specifies that a program for inspection of activities affecting quality shall be established and executed to verify conformance with the documented instructions, procedures and drawings for accomplishing an activity affecting quality.

- (2) The allegation that twenty-five to thirty Cadwelds are fabricated per Cadwelder on the second shift versus a rate of four to five per Cadwelder on day shift could not be substantiated. Records of Cadweld completion for four representative Cadwelders on day shift and swing shift were investigated and the rates were found to be comparable. This portion of this allegation was not substantiated.

j. Allegation No. 10

Only three Quality Control Civil inspectors do Cadweld inspections.

Findings

It was confirmed that, in fact, only three Brown & Root QC inspectors are involved in Cadweld inspection. This allegation, as stated, was substantiated; however, since the matter of Quality Control manpower loading had been discussed during a prior meeting between the Region IV and the licensee (Ref. letter dated August 25, 1978, W. C. Seidle to Houston Lighting & Power transmitting IE inspection report 50-498/78-13), this matter was not investigated any further.

k. Allegation No. 11

Brown & Root foremen can neither read nor write.

Findings

The matter of the ability of Brown & Root construction foremen to read or write was not investigated. It was confirmed by observation of the inspectors that the foremen were communicating

with their workers in an effective manner even though it was noted that language problems did exist. This allegation was neither substantiated nor refuted during the investigation. The matter of alleged communication problems will continue to be the subject of forthcoming inspections.

1. Allegation No. 12

Cadweld operations are proceeding in wet weather in violation of procedure.

Findings

During the investigation, weather conditions did not permit direct inspection of Cadwelding operations relative to wet or rainy weather. Discussions with Quality Control personnel and with Cadwelding personnel were insufficient to either confirm or deny this allegation. This allegation could neither be confirmed nor disproved.

m. Allegation No. 13

The Unit No. 2 Containment, the Mechanical Electrical Auxiliary, and the Fuel Handling Buildings are mislocated by one foot from the position shown on design drawings.

Findings

Discussions with the licensee by the IE inspectors confirmed that, in fact, an error in one dimension of the base mat for the Unit 2 Mechanical Electrical Auxiliary Building had been made; however, the reportability of this was being evaluated internally within the HL&P organization and a determination had not as yet been made. No general mislocation of other Unit 2 structures had been identified. This item is considered an unresolved item pending completion of the HL&P review to determine reportability in accordance with 10 CFR 50.55(e).

3. Other Areas of Concern

Incidental to the primary intent of this investigation, the following two areas were identified as being areas of concern by the IE inspectors:

- a. During review of Cadwelder qualification records, it was noted that the sequential Cadweld numbers 36H216 through 36H222, had been repeated and that Cadweld numbers 36V450 through 36V453 had not been utilized in sequence. This item was identified to the licensee for subsequent evaluation and follow up and is considered an unresolved item pending his determination of the proper sequencing of Cadweld numbers.

- b. During inspections of the various locations of the Unit 1 containment exterior wall, the containment interior work areas, and the Fuel Handling and Auxiliary Buildings, it was determined that a high percentage of fire extinguishers provided did not indicate a charged condition. On the exterior wall of the containment where Cadwelding operations were proceeding on a high cat-walk, it was observed that only one of four fire extinguishers indicated a fully charged condition. These findings were identified to the licensee and will be carried as an outstanding item for review during the next inspection.

4. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. Unresolved items disclosed during this investigation are discussed in paragraphs 2.a, 2.m and 3a.

5. Exit Interview

The IE inspectors met with licensee representatives (denoted in paragraph 1) at the conclusion of the investigation on September 14, 1978. The IE inspectors summarized the purpose and scope of the investigation, reviewed the allegations and the findings, and discussed the items of noncompliance and unresolved items. The licensee representatives expressed concern over the observed lack of fire protection observed by the IE inspectors and indicated that corrective action will be taken in this regard. They further committed to pursuing the items identified as unresolved in this investigation.