

APPENDIX

SPECIAL UNIT 1  
CABLE TRAY SUPPORT "AS-BUILT" PROGRAM INSPECTION

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

NRC Inspection Report: 50-445/85-19

Construction Permit: CPPR-126

Docket: 50-445

Category: A2

Applicant: Texas Utilities Electric Company (TUEC)  
Skyway Tower  
400 North Olive Street  
Lock Box 81  
Dallas, Texas 75201

Facility Name: Comanche Peak Steam Electric Station (CPSSES), Unit 1

Inspection At: Glen Rose, Texas

Inspection Conducted: November 18 - December 18, 1985

Inspectors: R. E. Lipinski 3/24/86  
R. E. Lipinski, NRR Date

J. R. Dale 3/28/86  
J. R. Dale, RIV Consultant Date

E. A. Solla 3/27/86  
E. A. Solla, NRR Consultant Date

R. E. Lipinski for 3/24/86  
T. Langowski, NRR Consultant Date

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Reviewed By: T. Barnes 3/28/86  
T. Barnes, Group Leader, Region IV CPSES Group Date

Approved: T. F. Westerman 3/28/86  
T. F. Westerman, Chief, Region IV CPSES Group Date

### Inspection Summary

Inspection Conducted November 18 - December 18, 1985 (Report 50-445/85-19)

Areas Inspected: Special, announced inspection of the Unit 1 cable tray support as-built inspection program and the related QA audit program for this activity. The inspection involved 224 inspector-hours onsite by six NRC personnel.

Results: Within the two areas inspected, three violations (failure of walkdown teams and QC inspectors to correctly determine and verify, respectively, as-built cable tray support attributes, paragraph 3.a-3.h; failure to perform periodic audits of the as-built cable tray support program, paragraph 6; use of weld angles in cable tray supports which were below the permissible minimum values, paragraph 5) were identified.

DETAILS1. Persons Contacted

- (\*)(\*\*R. A. Muldoon, Ebasco
- (\*)R. B. Bronson, Ebasco
- (\*)R. C. Iotti, Ebasco
- (\*)(\*\*R. M. Kissinger, Texas Utilities Generating Company (TUGCo)
- (\*)R. Siever, B&R
- (\*)(\*\*C. R. Hooton, TUGCo
- (\*)(\*\*R. E. Camp, TUGCo
- (\*)(\*\*W. F. Rockwell, Ebasco
- C. A. Briggs, TUGCo
- (\*\*)H. A. Harrison, TUGCo
- (\*\*)P. Halstead, TUGCo
- (\*\*)T. Brandt, TUGCo
- (\*\*)J. S. Marshall, TUGCo
- (\*\*)J. Vorderbrueggen, Impell
- H. A. Levin, TERA

The NRC inspectors also interviewed other applicant employees during this inspection period.

(\*)Denotes those present during November 22, 1985, exit meeting.

(\*\*)Denotes those present during December 5, 1985, exit meeting.

2. Cable Tray Support As-Built Inspection Program

The inspection was performed to verify the adequacy of the Unit 1 as-built inspection program for cable tray supports. The bases used for this inspection were: (a) TUGCo Nuclear Engineering (TNE) Procedure TNE-AB-CS-1, Revision 1, dated September 30, 1985, "As-Built Procedure, Cable Tray Hanger Design Adequacy Verification;" and (b) the as-built red lined drawings which were prepared by TUGCo walkdown teams (composed of a walkdown engineer and a QC inspector) in accordance with Procedure TNE-AB-CS-1, Revision 1.

From a total of 789 cable tray supports that had been through the walk-down program, a total of 66 supports were selected by the NRC inspection team using a random number generator. These supports were then broken

down by building and type. An engineered sample of 32 supports was selected. This sample included the following cable tray supports:

Reactor Building

CTH-1-42  
 CTH-1-239  
 CTH-1-4738  
 CTH-1-5488  
 CTH-1-5517  
 CTH-1-5538  
 CTH-1-5757  
 CTH-1-5787  
 CTH-1-5817  
 CTH-1-5873  
 CTH-1-5942  
 CTH-1-5976  
 CTH-1-6041  
 CTH-1-6497  
 CTH-1-6517  
 CTH-1-6559  
 CTH-1-6631  
 CTH-1-12075  
 CTH-1-13026

Fuel Building

CTH-1-1695  
 CTH-1-1716  
 CTH-1-1742  
 CTH-1-1845  
 CTH-1-1853  
 CTH-1-1963  
 CTH-1-5352  
 CTH-1-7047

Control Room

CTH-1-7199

Safeguards Building

CTH-1-207  
 CTH-1-607  
 CTH-1-636  
 CTH-1-707

As a result of this inspection, deficiencies were identified in major attributes associated with the Unit 1 cable tray supports red-lined as-built drawings.

3. Summary of Deficiencies (TNE-AB-CS-1)

A summary of the findings from this inspection which appear to be in violation of 10 CFR 50, Appendix B, Criterion X and TNE AB-CS-1, Revision 1, are as follows:

a. Tray Size

(1) Procedure Requirements

TNE-AB-CS-1, Revision 1, Section 4.2.2.B.7 requires verification of the following:

- "7. Cable Trays  
 a. Width  
 b. Depth  
 c. Location within Support"

(2) Findings

CTH-1-5817 is recorded as a 4" x 12" tray. It was found to be a 4" x 24" tray by NRC.

b. Tray Span(1) Procedure Requirement

TNE-AB-CS-I, Revision 1, Section 4.3.2. requires verification of the following:

"6. Indicate span from support to support . . ."

(2) Findings

- CTH-1-5817 conduit span was in error by 1'6".
- CTH-1-239 spans were in error by 8" and 10".

c. Tray Clamps(1) Procedure Requirement

TNE-AB-CS-1, Revision 1, Section 4.2.2.B.6 requires verification of the following:

- "a. Clamp Type (Attachment D)
1. Bolted
    - a. Flat washer or bevel washer
  2. Welded
    - a. Weld size and weld length will be verified in accordance with Reference 1-G."

(2) Findings

- CTH-1-12075 cable tray clamp was recorded as a Type B "Heavy Duty Clamp"  $\frac{1}{2}$ " plate welded to channel. Actual clamp was a Type C bolted clamp.
- CTH-1-1845 cable tray clamp G-2 was recorded as a bevel washer only, actual clamp contained a bevel and a flat washer.

d. Member Size(1) Procedure Requirement

TNE-AB-CS-1, Revision 1, Section 4.2.2.B requires verification of the following:

## "2. Hanger Configuration

- a. Member shape and nominal size per AISC (see Table 13 Or AISC manual of steel construction 7th edition)."

(2) Findings

CTH-1-5787 angle shape under tray was identified as 5/16" in thickness. Actual thickness was 7/16".

e. Weld Qualitative Measurement(1) Procedure Requirement

- ° TNE-AB-CS-1, Revision 1, Section 4.2.2.B. requires verification of the following:

## "3. Member Connection Details (Connection to support member)

- a. Welds shall be verified by the QC inspector in accordance with Reference 1-G."

- ° Reference 1-G, QI-QP-11.10-9 Cable Tray Hanger As-Built, (Inspection/Verification), Revision 2, Section 3.3.5 requires verification of the following:

"3.3.5 Welding Inspection

## 3.3.5.1 General

Welding shall be inspected for quantitative and qualitative attributes as listed below without paint removed.

## Quantitative

- a. Type of Weld (fillet, flare bevel, groove, etc.)
- b. Configuration (two sides all around, etc.)
- c. Weld Length
- d. Weld size"

- In Supplementary Safety Evaluation Report (SSER) 12, Section 3.8.3 which addresses FSAR Amendment 55, the applicant has been given approval to use Nuclear Construction Issue Group (NCIG) document NCIG-01, Revision 2 "Visual Weld Acceptance Criteria for Structural Welding to Nuclear Power Plants" (VWAC). VWAC specifies the following acceptance criteria for fillet welds:

"3.5.2.2 Acceptance Criteria: a fillet weld shall be permitted to be less than the size specified by 1/16 for  $\frac{1}{2}$  the length of the weld."

(2) Findings

- CTH-1-5942 fillet weld #1 was found to be 1/16" undersized from that recorded for greater than 1/4 of its length.
- CTH-1-1845 fillet weld detail B was found to be 5/16" undersized from the recorded for greater 1/4 of its length.
- CTH-1-5517 fillet weld #1 was found to be 1/16" undersized from that recorded for greater than 1/4 of its length.
- CTH-1-5488 fillet weld was found to be undersized 1/16" from that recorded for greater than 1/4 of its length.
- CTH-1-4738 fillet weld was found to be undersized 1/16" from that recorded for greater than 1/4 of its length.
- CTH-1-12075 measurement of the top and bottom of member weld lengths was recorded in reversed.
- CTH-1-1853 measurement of the top and bottom of member weld lengths was recorded in reversed.

f. Dimensional Measurements

(1) Procedure Requirements

- TNE-AB-CS-1, Revision 1, Section 4.2.2. requires verification of the following:
  - "A.2 Elevation (of lowest horizontal member)  
- - -
  - B.2. hanger Configuration  
- - -
  - b. Dimension, including addition of required dimensions.  
- - -

- f. Expansion anchor bolt projection and/or embedment (Table 12).

- - -  
B.4 Support Anchorage  
- - -

- e. Bolt distance from heel of angle or channel, etc. (Gage - 'G' dimension)"

(2) Findings

- CTH-1-5942 dimension to edge of column was in error 1".
- CTH-1-1845 dimension between attachments was in error 1' 3/4".
- CTH-1-1963 elevation was in error by 3" (Elevation A-A).
- CTH-1-42 gage dimension was in error 1".
- CTH-1-239 gage measurement was in error 5/16".
- CTH-1-1845 bolt projection measurement was in error 3/4"
- CTH-1-7047 bolt projection for bolts #1, and #2, was in error 1/4" and bolt #3 was in error 3/16".
- CTH-1-5976 bolt projection measurement was in error 1/2"

g. Bolt Size

(1) Procedure Requirement

- TNE-AB-CS-1, Revision 1, Section 4.2.2.B requires verification of the following:

"3.b Bolts  
1-Size"

(2) Findings

CTH-1-6631 hex nut was standard when a heavy hex nut was specified.

h. Member Orientation

(1) Procedure Requirements

- TNE-AB-CS-1, Revision 1, Section 4.2.2.B requires verification of the following:

"2. Hanger Configuration"



(2) Findings

- ° CTH-1-1845 angle to wall was rotated 90 degrees from drawing detail.

4. Other Findings Related to TNE-AB-CS-1a. Measurements

Criteria were not provided with respect to the required accuracy of measurements in obtaining TNE-AB-CS-1 red-line data. Variations in bolt projection and gage measurements were identified which appear to be attributable, in part, to the many different methods used to make the measurements. The applicant has indicated that TNE-AB-CS-1 will be revised to provide clear guidance with respect to measurements. This is considered an open item (445/8519-0-01).

The NRC inspectors compared NRC measured dimensions and the red-line recorded dimensions to the tolerances given in tables attached to TNE-AB-CS-1. Measurements which violated these tolerances are identified in paragraph 3 above.

b. Inaccessibility

The NRC inspectors identified that there were attributes which appeared accessible, although they had been identified as inaccessible.

The applicant stated that the training provided to the walkdown personnel instructed that measurements be taken only if they were fully accessible at the support. Further, the training provided gave instruction that all attributes of a particular component be fully accessible before it is inspected.

The applicant has indicated that the term inaccessible will be clarified by revision to TNE-AB-CS-1.

This considered an open item (445/8519-0-02).

5. Weld Bevel

In addition, the NRC inspectors noted weld bevels which appeared to be in violation of the American Welding (AWS) D1.1 Society Code. The quantitative weld attributes, such as bevel, were inspected by the applicant only for the first 100 supports in accordance with TNE-AB-CS-1. It was therefore not a requirement of the Unit 1 as-built cable tray program to verify weld bevel beyond the first 100 supports inspected.

The FSAR, Table 17A-1 states that cable tray hangers will be constructed in accordance with American Institute of Steel Construction (AISC) Code.

The AISC Code, Seventh Edition, Page 4-131, states that "The AISC Specification and the American Welding Society exempt from tests and qualification most of the common welding joints applicable to steel structures. When the joints . . . as designated as prequalified . . ."

Gibbs and Hill, Inc., Specification 2323-SS-16B, Section 6.4, dated May 7, 1975, states, "Welding construction shall conform to AISC Specification for Design, Fabrication and Erection of Structural Steel for Buildings and AWS D1.1."

The AWS D1.1-75 Code, Section 2.9.2.4 states with respect to weld groove angle, "The groove angle is minimum. It may be detailed to exceed the dimension shown by no more than 10 degrees."

The weld bevel for hanger drawing CTH-1-5538, full penetration weld #2, was found to be 30° by the NRC inspector. In addition, the weld bevel for hanger CTH-1-5517, ½" plate full penetration weld, was measured to be 36°-38°. The prequalified weld bevel specified by the hanger drawings (CTH-1-5538 and CTH-1-5517) was 45°.

The failure to control weld bevel angles appears to be in violation of the AISC Code/AWS D1.1 Code and 10 CFR 50, Appendix B, Criterion IX.

#### 6. Audit of As-Built Cable Tray Support Inspection Program

The NRC inspectors could find no objective evidence that the cable tray support as-built inspection program had been audited or scheduled to be audited.

The failure to establish planned periodic audits of the cable tray support as-built inspection program is considered to be in violation of 10 CFR 50, Appendix B, Criterion XVIII.

#### 7. Applicant Corrective Actions

The applicant promptly initiated the following corrective actions:

- ° TUGCo Engineering was requested to document and evaluate each finding to determine corrective action on November 22, 1985.
- ° Stop Work was issued to field activities associated with Unit 1 as-built/inspection program on November 26, 1985.
- ° A Corrective Action Request was issued on November 26, 1985.

- A TUGCo investigation was initiated to determine the cause. Personnel actions have resulted from the investigation underway.
- Inspection of the as-built program Unit 2 was initiated to determine if similar problems existed in Unit 2.
- The evaluation of actions necessary to resume the as-built program is in progress.

8. Exit Meeting

Exit meetings were held on November 22, 1985, and December 5, 1985, respectively, to discuss the initial and final findings from this inspection.

A subsequent exit meeting was held with TUGCo corporate management on December 18, 1985, to review the findings from this inspection, at which time, potential escalated enforcement action was discussed.

Those present included:

TUGCo

W. G. Council  
J. W. Beck

NRC

R. D. Martin  
V. S. Noonan