

SSER WRITEUP DOCUMENT CONTROL/ROUTE SHEET

1/15/84 5x

Allegation Numbers AE-17  
 Subject of Allegation Central Route Area Deficiencies  
 TRT Group Civil/Structural Group  
 Author: Joe Tapia

This sheet will be initialed by each reviewer. It stays with all revisions to the SSER writeup and serves as a routing and review record. It will be filed in the work package when the writeup is published.

Draft Number

Draft	1	2	3	4	5
Author	J. Tapia 8/23/84	8/23/84	8/23/84	8/23/84	8/23/84
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Revision Number

Final	1	2	3	4	5
Author					
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Administrative

Writeup integrated into SSER \_\_\_\_\_  
 Potential Violations to Region IV \_\_\_\_\_  
 Workpackage File Complete \_\_\_\_\_  
 Workpackage Returned to Group Leader \_\_\_\_\_

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R-340

SSER

1. Allegation Category: Civil and Structural 14, Control Room Area Deficiencies
2. Allegation Number: AE-17
3. Characterization: It is alleged that the field run conduit, the drywall, and the lighting installed in the area above the ceiling panels in the control room are classified as non-seismic and are supported only by wires and that these items may fall as a result of a seismic event.

4. Assessment of Allegation: The implied significance of this allegation is that if it is true, the ~~hazard to the control room operators~~ may cause injury to ~~them during seismic event~~ and adversely impact ~~the~~ plant safety.   
 *Failure of control room ceiling elements during a seismic event*  
 *ce*  
 *NCC The control room operators*  
 The Technical Review Team (TRT) electrical group reviewed the electrical aspects of this allegation (Electrical and Instrumentation Category 4). The Civil and Mechanical group of the TRT evaluated the seismic aspects of this allegation.

General Design Criteria No. 19 requires that safe occupancy of the control room during abnormal conditions be provided for in its design. The Comanche Peak Steam Electric Station (CPSES) control room is in a seismic Category I structure, with certain seismic Category II and nonseismic components located in the ceiling. Seismic Category I refers to those systems or components which must remain functional in the event of an earthquake. Seismic Category II refers to those systems or components whose continued functioning is not required, but whose failure could reduce the functioning of any Seismic Category I system or component (as defined in Regulatory Guide 1.29) to an unacceptable level or could result in an incapacitating injury to occupants of the control room. Seismic Category II systems or components are, therefore, designed

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and constructed so that a Safe Shutdown Earthquake (SSE) will not cause such failure or injury.

In assessing this allegation, the NRC TRT reviewed the CPSES nonsafety-related conduit, lighting fixtures, and the suspended ceilings installed in the control room. Three types of suspended ceiling exist in the control room: drywall, louvered, and acoustical. The following list designates those ceiling elements present in the control room and their seismic category designation:

- |  |                       |
|--|-----------------------|
| 1. Heating, Ventilating and Air Conditioning | - Seismic Category I  |
| 2. Safety-related Conduits                   | - Seismic Category I  |
| 3. Nonsafety-related Conduits                | - Seismic Category II |
| 4. Lighting Fixtures                         | - Seismic Category II |
| 5. Sloping Suspended Drywall Ceiling         | - Nonseismic          |
| 6. Acoustical Suspended Ceiling              | - Nonseismic          |
| 7. Louvered Suspended Ceiling                | - Nonseismic          |

The TRT also examined the control room ceiling system and pertinent design drawings, and met with cognizant Texas Utilities Electric Company (TUEC) engineers on July 31, 1984, to discuss the specific seismic analyses performed for the ceiling elements. In addition, the TRT held a conference call on August 1, 1984, with principal Gibbs & Hill (G&H) design engineers (at which TUEC representatives were present) to discuss the design and calculation procedures for the ceiling elements.

The TRT determined that none of the suspended ceiling elements were considered to be either seismic Category I or II; however, TUEC had modified the sloping suspended drywall to add more support. G&H could not provide backup calculations to support this modification, nor could TUEC provide justification for their position that the remaining suspended ceiling elements (i.e., the louvered and acoustic elements) would not fall and cause an incapacitating injury to operating personnel.

This would indicate failure of the quality assurance program to ensure that applicable provisions of Regulatory Guide 1.29 were fully met.

The TRT requested backup calculations for the sloping suspended drywall. TUEC provided the calculations on August 3, 1984, along with the calculation packages for the lighting fixtures, the nonsafety-related conduits larger than 2 inches in diameter, and the safety-related conduit. The TRT reviewed these calculations, except those for the safety-related conduit since they were designated as seismic Category I and therefore were excluded from the scope of this review.

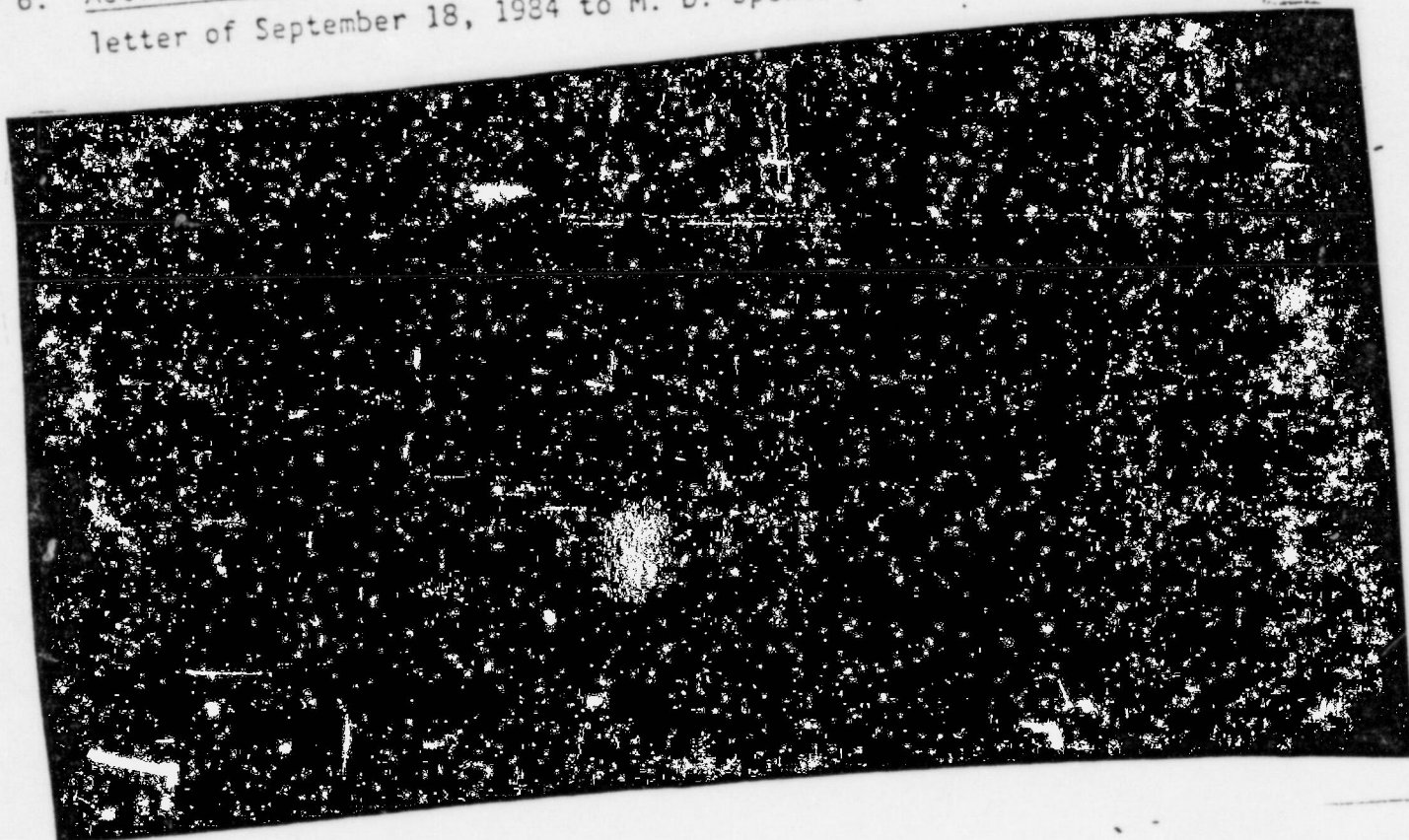
The TRT found that nonsafety-related conduits that were less than or equal to 2 inches in diameter were not supported by redundant seismic Category II cable restraints. The TRT also verified the adequacy of calculations for the nonsafety-related conduits larger than 2 inches in diameter.

The TRT found that the G&H calculations were based on the equivalent static load method, which involves multiplication of the dead weight of an item by an appropriate seismic acceleration coefficient. This equivalent static load calculation did not take into account the influence from the adjoining suspended ceilings on the calculated response. This was significant because redundant cable supports were not provided for the suspended louvered and acoustical ceilings, and the impact from the accelerations of the lighting fixtures was not considered in any analysis. The ceiling, as a whole, manifested a more complex configuration than that assumed in the equivalent static load analysis in that the effects from adjoining suspended ceilings were not considered. A justification based on the seismic response characteristics of the entire ceiling, which would account for the frequency content and amplification characteristics of the seismic motions, as represented by floor response spectra, is required to justify the value of the seismic acceleration coefficient used.

5. Conclusions and Staff Position: The TRT found that not all items in the Control room ceiling fall under the seismic Category I or II designation. Specifically, these items are the suspended drywall, acoustical and louvered ceilings. These components designated as nonseismic do not satisfy the provisions of Regulatory Guide 1.29 since they were not designed to accommodate seismic effects. Nonsafety-related conduits that are 2 inches in diameter and less also were not designed to accommodate seismic effects. TUEC presented no evidence which showed that the effect of failure of these items had been considered.

The TRT concludes that calculations supporting the seismic Category II lighting fixtures do not adequately reflect the rotational interaction with the ~~non~~ seismic items. In addition, the fundamental frequencies of the supported masses were not calculated to determine the influence of the seismic response spectrum at the control room ceiling elevation.

6. Actions Required: See Item II.d in the enclosure to the D. Eisenhower letter of September 18, 1984 to M. D. Spence (TUEC).





8. Attachments: None.

9. Reference Documents:

1. Calculation No. SCS-171C, Set No. 2, "Seismic Restraint of Lighting Fixtures," pages 1-37, dated January 14, 1981.
2. Design Change Authorization No. 10757, dated August 10, 1981.
3. Regulatory Guide 1.29, "Seismic Design Classification."
4. Texas Utilities Services, Inc. (TUSI) letter CPPA-11, 410, dated July 22, 1981.
5. Gibbs & Hill letter GTT-7965, dated August 7, 1981.
6. TUSI memorandum CPPA-40, 224, dated August 3, 1984.

10. This statement prepared by:

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J. Tapia, TRT

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Date

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Technical Reviewer:

C. Hofmayer

12/19/84

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