

# The Light company

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July 21, 1981  
ST-HL-AE-704  
SFN: V-0100



Mr. Darrell G. Eisenhut  
Division of Licensing  
Nuclear Regulatory Commission  
Washington, D. C. 20555

- References:
- (1) NRC Meeting Minutes dated March 3, 1975
  - (2) NRC FSAR Questions 130.11 and 12
  - (3) NRC Meeting Minutes dated May 23, 1979
  - (4) NRC Meeting Minutes dated October 11, 1979
  - (5) HL&P Letter Clarifying Reference 4 dated November 13, 1979
  - (6) HL&P Letter dated May 16, 1980

Dear Mr. Eisenhut:

South Texas Project  
Units 1 & 2  
Docket Nos. STN 50-498, STN 50-499  
Soil Structure Interaction

The purpose of this letter is to transmit the attached consultants reports on soil structure interaction (SSI) and to outline the HL&P position regarding the SSI analysis technique used for the design of the South Texas Project. During the review of the Preliminary Safety Analysis Report (PSAR), HL&P proposed to meet a new Staff position using the finite element technique for SSI. On February 13, 1975, a meeting (ref. 1) was held with the Staff to resolve the details of the criteria and procedures to be used and documented in the PSAR. The Safety Evaluation Report documented the acceptance of this approach. On April 15, 1979, the Staff requested (ref. 2) comparative alternate analysis techniques be provided. Following the receipt of these questions, meetings were held by the Staff and HL&P (including consultants) on May 10, 1979, September 18, 1979, and July 18, 1980 to discuss both the approach and the results of numerous SSI studies (References 3, 4, 5, & 6).

In January, 1981, HL&P commissioned two review task force committees of consultants to review the finite element methodology as employed at STP. One committee has been involved in the SSI studies since 1975 and was composed of STP SSI Project Team and Project Consultants. The second committee was composed of consultants not previously associated with STP. The individual members of the respective committees were:

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Project Team

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Professor of Civil Engineering, Univ. of Calif., Berkeley

Independent Consultant Team

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Department of Civil Engineering, Univ. of Calif., Berkeley

Dr. Jose M. Roesset

Department of Civil Engineering, Univ. of Texas, Austin

Dr. Robert V. Whitman

Department of Civil Engineering, M.I.T.

Each committee was charged individually with reviewing the following considerations:

- 1) the applicability of the finite element method for soil-structure interaction analyses to the STP site
- 2) the applicability of the procedures used in the seismic analysis of Category 1 structures
- 3) a review of the sources of conservatism for adequacy, including input motion
- 4) conservatism of the results

A summary of the respective findings and conclusions of the two committees are contained below:

Project Team Task Force Findings and Conclusions

"The finite element method used in the analysis of soil-structure interaction is an applicable and appropriate method for assessing soil-structure interaction effects at the STP. Based on examinations of various

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sources of conservatism, it is concluded that the results of the SSI analysis and the seismic structural analyses are very conservative for the design of the Category 1 structures and the subsystems at the STP site."

Independent Consultant Team Task Force Findings and Conclusions

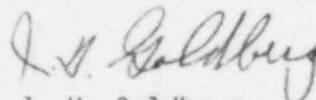
"The two-dimensional finite element method used by WCC was a generally accepted procedure in 1975. From our examination, it is clear that great care was taken in the development of the model for the soil profile and of the finite element representation, and in the selection of the parameters for the model. All of the regulatory requirements concerning uncertainty in soil properties and concerning the variations of ground motions with depth were satisfied. The Consultants have examined carefully a number of aspects of the results, particularly the computed response spectra at the base of the Reactor Containment Building. These results appeared to be quite reasonable for the depth of embedment and the soil properties and to be consistent with the natural frequencies of the building."

"In short, if this project were starting up fresh today, the Consultants would accept essentially the same types of analysis as that completed by WCC."

"Taking all considerations into account, the Consultants believe that the procedures used for analysis of soil-structure interaction and dynamic analysis are appropriate for the STP, and - if implemented properly or conservatively - should lead to forces and floor response spectra which are conservative for use in design. Where computed results were examined in detail, they appeared to be either correct or conservative, suggesting appropriate implementation for at least those parts of the analysis."

In view of the findings represented in the attached reports, HL&P is confident in the belief that the finite element analysis technique, utilized to establish the STP soil/structure interaction for seismic ground motions, was appropriate. HL&P does not believe that other methods of analysis for STP soil/structure interaction is either necessary or warranted.

Very truly yours,



J. H. Goldberg

Vice President

Nuclear Engineering & Construction

JGW/amj  
Attachment

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