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Director, Office of Nuclear Reactor Regulation
Attention: D. M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Subject: Docket No. 50-206
SEP Topic III-6
Seismic Design Considerations
San Onofre Nuclear Generating Station
Unit 1

Your letter dated January 19, 1982 provided comments regarding SCE's seismic reevaluation program. With the exception of item 1, the responses to your comments are provided as an enclosure to this letter. The response to item 1 will be provided by June 4, 1982.

If you have any questions or require additional information, please let us know.

Very truly yours,

M. D. Medford

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Item

The program plan for BOP structures refers to a Reference 8, Design Guide C-2.44. It appears to be a Bechtel inhouse document which should be made available for review.

Response

Information pertaining to the methods and criteria used in the BOPS seismic reevaluation program can be found in BC-TOP-4A, Revision 3. Design Guide C-2.44 is a Bechtel internal document which is similar to the topical report with respect to the content of Sections 3.1, 3.2 and 4 of Reference 8 which are referred to in the program plan. Review of BC-TOP-4A is adequate in lieu of the Bechtel internal design document. Therefore, please substitute for Reference 8:

- (8) Bechtel Topical Report, "Seismic Analyses of Structures And Equipment For Nuclear Power Plants, BC-TOP-4A, Revision 3, November 1974.

Item

For the concrete enclosure building and containment sphere, it is not clear how soil-structure interaction is modeled. More information is needed to complete a review.

Response

The modeling of soil structure interaction for the containment is described in the following documents:

- (1) Letter from K. P. Baskin to A. Schwencer dated May 18, 1977, Subject: Seismic Reevaluation and Modifications, San Onofre Nuclear Generating Station, Unit 1
- (2) Letter from K. P. Baskin to D. L. Ziemann, dated April 11, 1980, Subject: Seismic Backfit Project and Site Specific Earthquake Program, San Onofre Nuclear Generating Station, Unit 1

The relationship of soil structure interaction between the containment and sphere enclosure building is described in

- (1) Amendment 52 to the San Onofre Nuclear Generating Station, Unit 1, Final Safety Analysis
- (2) Letter from J. B. Moore to R. A. Purple dated March 1, 1976 forwarding Supplement to Sphere Enclosure Project Report
- (3) Letter from K. P. Baskin to D. L. Ziemann dated April 11, 1980, Subject: Seismic Backfit Project and Site Specific Earthquake Program, San Onofre Nuclear Generating Station, Unit 1

The references described above provide a complete description of the soil-structure interaction modeling of the enclosure building and containment.

Item

Computer codes applied to BOP structures are not described.

Response

The computer codes utilized in the analysis of structures are described in the reports entitled "Balance of Plant Structures Seismic Reevaluation Program", and "Balance of Plant Structures Seismic Reevaluation Program - Control and Administration Building". These two reports were transmitted by letters from K. P. Baskin to D. M. Crutchfield dated December 8, 1981 and February 9, 1982, respectively. These reports covered all structures except the turbine building and the fuel storage building. The computer codes described in these reports are also being used in the analysis of the turbine building. Computer codes applied to the evaluation of the fuel storage building will be described with the results of this evaluation.

Item

For the Ventilation Equipment Building, the program assumes a rigid structure and neglects soil-structure interaction, in order to apply the static analysis method. Justification is required.

Response

Although the BOPSSR criteria states that the intended method of analysis for the ventilation equipment building was the static analysis technique, a dynamic response spectrum analysis was performed. This analysis is described in the report entitled "Balance of Plant Structures Seismic Reevaluation Program", which was transmitted by letter dated December 8, 1981 from K. P. Baskin to D. M. Crutchfield. The analysis method is described in Section 3.1.3. As stated in that section of the report, the building was not assumed rigid, soil structure interaction was not neglected, and the building was not analyzed by the static analysis method.

Item

Referring to Section 3.7.3.5 of program plan for BOP structures, clarification is needed on how multi-degree systems will be evaluated by static analysis method.

Response

The evaluation reports for all structures, except for the turbine building and the fuel storage building, have been submitted by SCE letters dated December 8, 1981 and February 9, 1982. These reports describe in detail the analysis procedures and results obtained. The specific application of static analysis methods, where appropriate, is described. The turbine building and fuel storage building are being analyzed by dynamic analysis methods, and therefore, the provisions of section 3.7.3.5 do not apply to these structures.

Item

At least one more time history analysis of the NSSS using a different set of time histories is required because nonlinear response of the system is very sensitive to characteristics of the input time histories while many of the components, according to the nonlinear analysis, have a safety margin of only 1.1.

Response

Information pertaining to the adequacy of the time-histories utilized in the reevaluation of the NSSS was provided by letter dated April 11, 1980 from K. P. Baskin to D. L. Ziemann. Based on that information, it is concluded that performing an additional time history analysis is not required.

Item

Only the NSSS system has been fully addressed. A scope or list of the remaining equipment and systems is given in Ref. 1,* but no methodology or procedure is mentioned.

Response

The methodology and criteria being utilized in the Balance of Plant Mechanical Equipment and Piping (BOPMEP) Seismic Reevaluation Program was submitted to the NRC by letter dated October 8, 1981.

Item

Reevaluation criteria for electrical equipment supports is not available for review.

Response

The criteria which was utilized in the reevaluation of the anchorage of electrical equipment is attached. It should be noted that the in-structure response spectra in Figure 4.2 of this attachment were based on estimates of the floor response spectra in the control room. Actual floor response spectra are now available at this location from the BOPS Seismic Reevaluation Program. A comparison of these spectra indicates that the spectra in the attachment were not completely conservative. Therefore, we will review our calculations and design margins for electrical equipment in the control room and implement any additional modifications which may be required.

Item

Verification of Westinghouse analysis codes was not provided.

Response

Verification of the Westinghouse code WECAN used in the analysis of the NSSS was provided in WCAP-8281, "Verification of the WECAN Computer Program Nonlinear Elastic Dynamic Analysis Capability," May 1974.

* 1. Letter from K. P. Baskin of Southern California Edison Company to D. M. Crutchfield of NRC, July 7, 1981.