AUG 9 1977

MEMORANDUM FOR: K. R. Goller, Assistant Director for Operating Reactors, DOR

FROM: L C. Shao, Chief, Engineering Branch, DOR

SUBJECT: SEISMIC QUALIFICATION OF OCONEE EMERGENCY POWER PLANT

Plant Name: Oconee Nuclear Station Units 1, 2 and 3
Docket Numbers: 50-269, 50-270, 50-289
Branch and Project Manager Requesting Assistance: ORB-1, J. Neighbors
Review Branches Involved: Engineering Branch, Plant System Branch
Description of Request: TAC 6048 - ORB-1-250
Review Status: Requesting Additional Information

The Engineering Branch, Division of Operating Reactors, has reviewed the information submitted with the letter dated October 7, 1976 and April 13, 1977.

We find that we need additional information, as indicated in the enclosure, before we can complete our review.

L. C. Shao, Chief
Engineering Branch
Division of Operating Reactors

Enclosure:
As stated

DISTRIBUTION:
Central Files
EB-Rdg
EB-File Number 6.48

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OCONEE NUCLEAR STATION UNITS 1, 2, & 3

SEISMIC CAPABILITY OF EMERGENCY POWER PATH

ENGINEERING BRANCH - DIVISION OF OPERATING REACTORS

REQUEST FOR ADDITIONAL INFORMATION - TAC #6048

9. In your response to Q16 it is indicated that passive earth pressure has been relied upon to resist sliding and overturning effects. For shallow foundation embedment in backfill material, it is unconservative to rely upon the passive earth resistance. For those cases of deep embedment, factors of safety against sliding should be calculated in such a way that slip circle failure due to shear stress is prevented. One of the acceptable methods of calculating the factor of safety against overturning is given in BC-TOP-4A. It should be noted that the original intent of this question was to determine to what extent the effect of the foundation interaction with the surrounding soil modifies the freefield seismic motion. Provide a discussion indicating in each case how soil-structure interaction was accounted for. Also provide a statement indicating that the factors of safety against sliding and overturning for each foundation meet the acceptance criteria stated in Section 3.8.5.II.5 of the Standard Review Plan.

10. In your response to Q1e indicate that the effects of one horizontal and one vertical earthquake components are combined on the basis of the absolute sum method.

11. In your response to Q1f, the reference to 5A.3 of the Appendix 5A to the FSAR is not satisfactory. Indicate your intent to qualify each foundation to meet the load combinations and acceptance criteria per Section 5A.2.2 of the Appendix 5A to the FSAR.

12. In your response to Q2 it should be noted that the National Electric Safety Code (NESC) heavy loading provides for ice and wind loading, and does not include the effects of seismic loading. Since the load combinations referred to in section 5A.2.2 of the Appendix 5A to the FSAR are not applicable to the transmission line and the towers, appropriate load combinations and the corresponding acceptance criteria should be chosen from the sections 3.8.4.II.3 & 5 of the Stnadard Review Plan, and clearly identified in your response. The modal analysis for the tower, in an unloaded condition, to predict the seismic loading is not acceptable. The effect of seismic loading consists of two parts: (1) the effect of inertia loading on both the towers and the transmission line; for the towers the input may be the ground response spectra, but the input for the lines should be the appropriate amplified response spectra corresponding to the attachment point, (2) the effect of ground displacement; the ground displacement would cause stretching of the lines and this in turn would impose corresponding loading on the towers. The stresses from (1) and (2) above should be combined by the absolute sum method to obtain the seismic loading which

in turn should be used in appropriate load combinations along with other loads. Provide specific responses to the previous Q2 including the concerns expressed in the clarifications detailed above.

13. In your response to Q2 failure of secondary bracing members is predicted. In combination with Q12 above it should be noted that whenever members are predicted to fail, subsequent analyses must be performed on the model that excludes the failed members, and the resulting stresses and displacements must meet appropriate acceptance criteria.

14. In your response to Q3a it is stated that seismic loads were generated as prescribed on page 5A-3 of the FSAR. The referenced page simply provides the ground response spectra. However, in order to obtain the seismic loading for the Relay House a dynamic analysis of its mathematical model should be performed. Therefore, provide the specific information requested in Q3a and provide a stress summary of the critical sections.

15. In your response to Q3b it is stated that a seismic force of 0.36g has been assumed to be applied to equipment supported on the foundation and the structural steel framed building. Floor response spectra for points of attachment provide the maximum responses for a range of natural frequencies. When the equipment has more than one degree of freedom, the effective acceleration is usually greater than the response from the predominant mode. Demonstrate the conservatism of the 0.36g static coefficient through a comparison of response obtained from a dynamic analysis of the multimode equipment subjected to floor response spectra.

16. In your response to QA, note that the Section 5A.2 of the FSAR simply states that where the analysis is difficult the highest acceleration from the response spectrum curve is to be used. For 2% damping this value is approximately 0.36g. Provide justifications for ignoring contributions from higher modes (see your own discussion in note CC in response to Q7).

17. In your response to Q6 it should be noted that the power circuit breakers must be verified by at least prototype testing for demonstration of operability in the seismic environment.

18. Periodic inspection and testing of electrical power systems are required by the General Design Criterion number 18 of the Appendix A to 10 CFR part 50 and by the Regulatory Guide 1.118 entitled "Periodic Testing Of Electrical Power And Protection Systems". Provide the details of a program of inservice inspection and testing that would be incorporated in your technical specifications.