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HSilver	TBAbernathy, TIC
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MRushbrook	
MService	
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Docket Nos. 50-327/328
50-390/391
50-438/439

12/27/77

Tennessee Valley Authority
ATTN: Mr. Godwin Williams, Jr.
Manager of Power
830 Power Building
Chattanooga, Tennessee 37201

Gentlemen:

SUBJECT: SEISMIC DESIGN BASIS FOR THE SEQUOYAH, WATTS BAR, AND BELLEFONTE NUCLEAR PLANTS

This letter is to inform you of a question that has arisen concerning the seismic design bases for the Sequoyah, Watts Bar, and Bellefonte plants for which construction permits were issued on May 27, 1970, January 24, 1973, and December 24, 1974, respectively. All three plants lie within a tectonic province where the largest historical earthquake was the 1897 Giles County, Virginia earthquake, an Intensity VIII event. Past and present staff requirements specify that the safe shutdown earthquake (SSE) for plant design be determined assuming that the Intensity VIII event could reoccur near the plant sites. Correlations which were based on distant earthquakes and are now considered inappropriate for converting intensity to ground acceleration for earthquakes assumed to occur near a site, were used in establishing an acceleration of 0.18g as the SSE design basis for each of the three sites. The specific response spectra anchored to the acceleration were selected on the basis of the practice current at the time of reviews for construction permits.

In 1973 Appendix A to 10 CFR Part 100, and in 1975 the staff Standard Review Plan were put into effect. Appendix A lays out the basic approach for determining the SSE while the Standard Review Plan indicates specific Regulatory Guides, procedures, and techniques that may be used for this purpose. Certain aspects of the initial analysis performed for the Sequoyah, Watts Bar, and Bellefonte plants are not affected. We still regard the Giles County Earthquake as being the controlling event for these sites and we still consider that to be an Intensity VIII event. What has changed, however, are the procedures used to convert this intensity to design spectra. We not accept an intensity-acceleration

relationship based upon a more complete data set (Trifunac and Brady, 1976) which associated a mean peak acceleration of 0.25g with Intensity VIII. We also presently determine response spectra as indicated in Regulatory Guide 1.60 entitled "Design Response Spectra for Seismic Design of Nuclear Power Plants." In general, current practice results in the selection of more conservative response spectra than did our past practice.

Our current approach, as specified in the Standard Review Plan, would require a plant being built in the same region as Watts Bar, Sequoyah, and Bellefonte to be designed to withstand a more conservative design basis earthquake than either plant is currently designed for. Because of the actual procedures utilized for three plants, a detailed analysis of plant response to a larger earthquake than the SSE selected at the construction permit stage of review may show that the plants, as designed, are adequate with respect to the intent of Appendix A and other regulations. This is possible since the procedures generally used, such as the Trifunac and Brady intensity-acceleration correlation and the Regulatory Guide 1.60 procedures for determining response spectra, are general and do not take into account specific site conditions, earthquake magnitude, or distance to the earthquake source.

We will need additional information from you to confirm the adequacy of the seismic design of the Sequoyah, Watts Bar, and Bellefonte plants, and to assess whether the application of current staff practice with regard to selection of seismic response spectra is required for the public health and safety. One approach that might be sufficient is to use existing strong motion records to determine the response spectra predicted for an earthquake of the appropriate magnitude and distance for the site conditions, and then show these spectra to be within the design spectra. In any event, we will need additional analyses from you to conclude that the present plant designs are acceptable, or to determine modifications that may be required.

Please notify us of your schedule for accomplishing this within 60 days of receipt of this letter. We would pleased to meet with you to provide further clarification of this matter.

Sincerely,

Original signed by:
Roger S. Boyd

Roger S. Boyd, Director
Division of Project Management
Office of Nuclear Reactor Regulation

CCS:
See page 3

SEE PREVIOUS YELLOW FOR CONCURRENCES

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