

COMPARISON OF SITE DEPENDENT AND REGULATORY AGENCY
EARTHQUAKE INPUT MOTION USED IN THE DESIGN OF NUCLEAR POWER PLANT
by

Joseph A. Fischer, Jong C. Peir and Bill T. D. Lu

SYNOPSIS

Thirty-three (33) earthquake records, as well as the artificial time history generated in accordance with the U.S. Nuclear Regulatory Commission's (USNRC) Regulatory Guide 1.60 were used in the seismic response analyses of a nuclear power plant site. The results of this study indicate that the use of seismic input generated in accordance with Regulatory Guide 1.60 requirements is conservative.

INTRODUCTION

The characteristics of the incoming earthquake ground motion and the site geology can influence the dynamic response of a site. In recent years, in the U.S. nuclear plant design, the seismic input has been artificially generated to yield response spectra defined by the U.S. Nuclear Regulatory Commission's (NRC) Regulatory Guide 1.60. In an attempt to develop plant design conservatism, much of the true site response can be masked by this procedure.

SEISMIC INPUT

In a recent project for a floating nuclear power plant off the northeastern coast of the United States, the authors studied the relationship between a range of "real" shocks (thirty three earthquake records), as well as the artificial time history generated as outlined in Regulatory Guide 1.60.

SEISMIC RESPONSE ANALYSIS

A series of one-dimensional seismic response evaluations were performed. Earthquake time histories were divided into several categories on the basis of the site conditions upon which the earthquakes were recorded.

First, the seismic-induced shear stresses within an actual site soil profile, using each normalized earthquake record as input, were determined and compared, on a statistical basis with the shear stresses induced by a Regulatory Guide 1.60 earthquake time history. The effect, upon the response of the soil profile, of earthquake duration and frequency content was also studied.

CONCLUSION

The results of this study indicate that the use of seismic input obtained from Regulatory Guide 1.60 will yield conservative results. The extent of conservatism depends on the characteristics of specific site geological conditions. Although the use of seismic input obtained from Regulatory Guide 1.60 may be useful in providing a preliminary evaluation of the site seismic response, its use, without a full understanding of its inherent conservatism may needlessly penalize sites otherwise suitable for nuclear facility construction.

Dames & Moore, New York, New York