EARTHQUAKE SAFETY OF NUCLEAR POWER PLANTS - AN INTERPRETIVE REVIEW OF CURRENT DESIGN PRACTICE AND THE RELATED REGULATORY SYSTEM IN WEST GERMANY

by

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SYNOPSIS

The German nuclear safety standard KTA 2201: "Design of nuclear power plants against seismic events" consists of the following parts

1. Basic principles
2. Characteristic data on seismic input
3. Design of structures
4. Design of machinery and electrical equipment
5. Seismic instrumentation
6. Plant operation subsequent to an earthquake

The progress made in the development of this safety standard is reported giving detailed comments on the first and fifth part.

INTRODUCTION

In view of the significant differences in numerical relation, frequency and force between the seismicity of Germany and of other countries, it was realized rather early that a simple and literal application of the standards of countries with high seismicity would not be advisable for the Federal Republic of Germany. The particular seismic conditions of Germany as an area of comparatively low seismicity not only justify, but even make the introduction of a standard tailored to these conditions advisable. The purpose of this paper is to present some of our seismic design requirements and discuss them in comparison with those of other countries.

Part 1 of the standard KTA 2201 only provides a general survey on the objectives of seismic design. In particular, two reference earthquakes are defined: the Design Earthquake (DE) and the Safety Earthquake (SE). The DE is equivalent to the greatest intensity that had ever been experienced within the same seismotectonic province and within 50 km; the SE corresponds to the greatest intensity that could occur within an aerea of up to 200 km from the site. Special details of seismic design requirements will be in the other parts. For example Part 2 deals with the intensity/acceleration/distance - correlations, regional and site - specific response spectra, determination of representative earthquake time functions and standard investigations for the purpose of determining dynamic characteristic data for soil foundation. Part 3 and 4 will clarify especially the determination of realistic damping values, permissible stress limits for certain materials, repercussions of simplifications and assumptions on the dynamic analysis processes. The number, location and characteristic of seismic instrumentation as well as the requirements of plant inspection after the occurence of an earthquake will be the special contents of Part 5 and 6.

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