EARTHQUAKE INSTRUMENTATION REQUIREMENTS FOR NUCLEAR POWER PLANTS IN THE UNITED STATES

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SYNOPSIS

Limited recorded seismic data has initiated significant developments in earthquake instrumentation and engineering. These developments are the bases for seismic instrumentation requirement presently specified by industry standards, code of federal regulations, USNRC regulatory guides, standard review plans and standard format and content of safety analyses reports for safety related structures, system and components for nuclear power plants and fuel reprocessing plants.

INTRODUCTION

Prior to the last decade, available earthquake instrumentation and the requirement for such instrumentation was limited to verify functional capability of nuclear safety structures, systems and components during and after an earthquake. Recent development in earthquake instrumentation and engineering has implemented new and improved requirements for earthquake instrumentation and engineering evaluation of recorded earthquake data.

INDUSTRY STANDARDS

ANSI N 18.5 standard defines the minimum requirements for an earthquake instrumentation system to be installed at nuclear power plants in order to provide information on the input vibratory ground motion and resultant vibratory response of safety related structures and systems should an earthquake occur. It also specifies instrumentation characteristics and installation locations. ANSI N 643 will cover guidelines for retrieval, review, processing and evaluation of records obtained from seismic instrumentation.

USNRC REGULATORY GUIDES AND REGULATIONS

Code of Federal Regulations, 10 CFR Part 100 Appendix A "Seismic and Geologic Siting for Nuclear Power Plants" requires a suitable program for implementing with regard to seismic instrumentation needed to determine promptly the seismic response of nuclear power plant features important to safety to permit comparison of such response with that used as the design basis. This comparison is needed to decide whether the plant can continue to be operated safely. USNRC Regulatory Guide 1.12 describes the seismic instrumentation acceptable to NRC staff as the requirements of Appendix A to 10CFR Part 100. This guide does not, however, address the need for instrumentation that would automatically scram a nuclear power plant or specify the methods to be used in the analysis of recorded data. This guide also refers to ANSI N 18.5 with certain modifications and requires a response spectrum recorder in addition to triaxial time history accelerographs, triaxial seismic switch and triaxial peak accelerographs. In addition to regulatory guides and federal regulations, USNRC standard format and content of safety analysis reports and standard review plans for nuclear power plants also describe earthquake instrumentation requirements for nuclear power plants in the United States. USNRC Regulatory Guide 3.17 describes earthquake instrumentation, for fuel reprocessing plants, which will be used for prompt determination of the seismic reponse of safety related features for the fuel reprocessing plant.

SUMMARY

Improved standards by industry and nuclear regulatory agencies for earthquake instrumentation is a significant achievement for the nuclear standardization program, due to which much can be accomplished in understanding behavior of safety related structures, components and systems of the nuclear power plant.

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