



Seismic Monitoring System for Nuclear Power Plants

Seismic Design In Nuclear Power Plants

H Kauffman



Seismic Design In Nuclear Power Plants:

Seismic Design and Qualification for Nuclear Power Plants International Atomic Energy Agency, 2003 This Safety Guide provides recommendations on a generally accepted way to design a nuclear power plant so that an earthquake motion at the site will not jeopardize the safety of the plant It also gives guidance on a consistent application of methods and procedures for analysis testing and qualification of structures and equipment so that they meet the safety requirements covering the design of nuclear power plants safety assessments for the design and the regulatory issues concerned with the licensing of plants

Seismic Design for Nuclear Power Plants Robert J. Hansen, 1970 The development of protective measures to guard against the spread of radioactive debris following reactor disasters has been given extensive and careful engineering attention over the past several years Much of this attention has been devoted to eliminating or minimizing the effects of malfunctions of internal components But reactors can also suffer externally caused disasters for example their radioactive cores can be damaged by earthquakes or by missiles generated by tornadoes Earthquakes in particular will continue to render man vulnerable even to the peaceful atom as the number of nuclear power plants increases and as they come to be located in those parts of the world that have a history of seismic activity It was to consider such problems that the seminar reported here was held The conferees who are leaders in this special and important field gathered in Cambridge Massachusetts in spring 1969 to present the papers whose titles are listed below Together they cover both the theoretical underpinnings of the subject and specific applications to nuclear reactors they provide both useful summaries of what is known to date and some new thinking on the subject not before published Contents Preface T J Thompson Foreword R J Hansen Introduction R V Whitman Geological and Seismological Factors Influencing the Assessment of a Seismic Threat to Nuclear Reactors Daniel Linehan S J Geophysics Keiiti Aki Design Seismic Inputs C Allin Cornell Some Observations on Probabilistic Methods in the Seismic Design of Nuclear Power Plants C Allin Cornell Seismic Risk and Seismic Design Decisions Luis Esteva Fundamentals of Soil Amplification J M Roesset Soil Structure Interaction R V Whitman Evaluation of Soil Properties for Site Evaluation and Dynamic Analysis of Nuclear Plants R V Whitman Structural Response to Seismic Input J M Biggs Seismic Analysis of Equipment Mounted on a Massive Structure J M Biggs and J M Roesset Modal Response of Containment Structures Peter Jan Pahl Provision of Required Seismic Resistance M J Holley Jr A Measure of Earthquake Intensity Arturo Arias Closure R J Hansen

Seismic Design and Qualification for Nuclear Power Plants, 1992 This guide was originally issued as Safety Guide No 50 SG S2 It provides details on the design of a nuclear power plant such that earthquakes at the site determined according to Safety Guide No 50 SG S1 will not jeopardize its safety It gives guidance on methods and procedures for analysing testing and qualifying structures and equipment such that they fulfil the purpose foreseen in the design

Seismic Design for Nuclear Power Plants Robert J. Hansen, 1970

Earthquake Engineering for Nuclear Facilities Masanori Hamada, Michiya Kuno, 2016-12-12 This book is a comprehensive compilation of earthquake

and tsunami related technologies and knowledge for the design and construction of nuclear facilities As such it covers a wide range of fields including civil engineering architecture geotechnical engineering mechanical engineering and nuclear engineering for the development of new technologies providing greater resistance against earthquakes and tsunamis It is crucial both for students of nuclear energy courses and for young engineers in nuclear power generation industries to understand the basics and principles of earthquake and tsunami resistant design of nuclear facilities In Part I Seismic Design of Nuclear Power Plants the design of nuclear power plants to withstand earthquakes and tsunamis is explained focusing on buildings equipment s and civil engineering structures In Part II Basics of Earthquake Engineering fundamental knowledge of earthquakes and tsunamis as well as the dynamic response of structures and foundation ground are explained

Seismic Design for Nuclear Power Plants, 1970 *Nuclear Power Plant Design and Seismic Safety Considerations*, **Seismic Design for Nuclear Power Plants** Richard J. Hansen, 1970 **Nuclear Power Plant Design and Seismic Safety Considerations** Anthony Amdreus, Peter Folger, 2012-06-22

The earthquake and subsequent tsunami that devastated Japan s Fukushima Daiichi nuclear power station and the earthquake that forced the North Anna VA nuclear power plant s temporary shutdown have focused attention on the seismic criteria applied to siting and designing commercial nuclear power plants Some Members of Congress have questioned whether U S nuclear plants are more vulnerable to seismic threats than previously assessed particularly given the Nuclear Regulatory Commission s NRC s ongoing reassessment of seismic risks at certain plant sites The design and operation of commercial nuclear power plants operating in the United States vary considerably because most were custom designed and custom built Boiling water reactors BWRs directly generate steam inside the reactor vessel Pressurized water reactors PWRs use heat exchangers to convert the heat generated by the reactor core into steam outside of the reactor vessel U S utilities currently operate 104 nuclear power reactors at 65 sites in 31 states 69 are PWR designs and the 35 are BWR designs One of the most severe operating conditions a reactor may face is a loss of coolant accident LOCA which can lead to a reactor core meltdown The emergency core cooling system ECCS provides core cooling to minimize fuel damage by injecting large amounts of cool water containing boron borated water slows the fission process into the reactor coolant system following a pipe rupture or other water loss The ECCS must be sized to provide adequate makeup water to compensate for a break of the largest diameter pipe in the primary system i e the so called double ended guillotine break DEGB The NRC considers the DEGB to be an extremely unlikely event however even unlikely events can occur as the magnitude 9.0 earthquake and resulting tsunami that struck Fukushima Daiichi proves U S nuclear power plants designed in the 1960s and 1970s used a deterministic statistical approach to addressing the risk of damage from shaking caused by a large earthquake termed Deterministic Seismic Hazard Analysis or DSHA Since then engineers have adopted a more comprehensive approach to design known as Probabilistic Seismic Hazard Analysis PSHA PSHA estimates the likelihood that various levels of ground motion will be exceeded at a given location in a given future time period

New nuclear plant designs will apply PSHA In 2008 the U S Geological Survey USGS updated the National Seismic Hazard Maps NSHM that were last revised in 2002 USGS notes that the 2008 hazard maps differ significantly from the 2002 maps in many parts of the United States and generally show 10% 15% reductions in spectral and peak ground acceleration across much of the Central and Eastern United States CEUS and about 10% reductions for spectral and peak horizontal ground acceleration in the Western United States WUS Spectral acceleration refers to ground motion over a range or spectra of frequencies Seismic hazards are greatest in the WUS particularly in California Oregon and Washington as well as Alaska and Hawaii In 2010 the NRC examined the implications of the updated NSHM for nuclear power plants operating in the CEUS and concluded that NSHM data suggest that the probability for earthquake ground motions may be above the seismic design basis for some nuclear plants in the CEUS In late March 2011 NRC announced that it had identified 27 nuclear reactors operating in the CEUS that would receive priority earthquake safety reviews

Seismic Design of Nuclear Power Plants in Japan, 1995 Seismic Design of Nuclear Power Plants Applied Nucleonics Co, George E. Howard, Paul Ibáñez, Craig B. Smith, Electric Power Research Institute, 1975 **Seismic Design of Nuclear Power Plants, an Assessment** Applied Nucleonics Company, George E. Howard, Paul Ibáñez, Craig B. Smith, 1975 **Проектирование и аттестация сейсмостойких конструкций для атомных станций : руководство по безопасности** International Atomic Energy Agency, 1998 *Seismic Design of Nuclear Power Plants* Applied Nucleonics Company, George E. Howard, Paul Ibáñez, Craig B. Smith, Conway Chan, Electric Power Research Institute, 1975 **Seismic Analysis and Testing of Nuclear Power Plants** International Atomic Energy Agency, 1979 CONFERENCE ON SEISMIC DESIGN FOR NUCLEAR POWER PLANTS, CAMBRIDGE, MASS., 1969 ,1970 **Study of Seismic Design Bases and Site Conditions for Nuclear Power Plants**, 1980

This report presents the results of an investigation of four topics pertinent to the seismic design of nuclear power plants Design accelerations by regions of the continental United States review and compilation of design basis seismic levels and soil conditions for existing nuclear power plants regional distribution of shear wave velocity of foundation materials at nuclear power plant sites and technical review of surface founded seismic analysis versus embedded approaches

Damping Values for Seismic Design of Nuclear Power Plants U.S. Atomic Energy Commission. Regulatory Directorate of Regulatory Standards, 1973 **Seismic Risk Analysis of Nuclear Power Plants** Wei-Chau Xie, Shun-Hao Ni, Wei Liu, Wei Jiang, 2019-04-18 Seismic Risk Analysis of Nuclear Power Plants addresses the needs of graduate students in engineering practicing engineers in industry and regulators in government agencies presenting the entire process of seismic risk analysis in a clear logical and concise manner It offers a systematic and comprehensive introduction to seismic risk analysis of critical engineering structures focusing on nuclear power plants with a balance between theory and applications and includes the latest advances in research It is suitable as a graduate level textbook for self study or as a reference book Various aspects of seismic risk analysis from seismic hazard demand and fragility analyses to seismic risk quantification are

discussed with detailed step by step analysis of specific engineering examples It presents a wide range of topics essential for understanding and performing seismic risk analysis including engineering seismology probability theory and random processes digital signal processing structural dynamics random vibration and engineering risk and reliability *Seismic Design and Qualification for Nuclear Power Plants* IAEA,2003-06-30 This Safety Guide provides recommendations on a generally accepted way to design a nuclear power plant so that an earthquake motion at the site will not jeopardize the safety of the plant It also gives guidance on a consistent application of methods and procedures for analysis testing and qualification of structures and equipment so that they meet the safety requirements covering the design of nuclear power plants safety assessments for the design and the regulatory issues concerned with the licensing of plants

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