

Design And Construction Of Nuclear Power Plants

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.

Design and Construction of Nuclear Power Plants John Wiley & Sons

Despite all the efforts being put into expanding renewable energy sources, large-scale power stations will be essential as part of a reliable energy supply strategy for a longer period. Given that they are low on CO₂ emissions, many countries are moving into or expanding nuclear energy to cover their baseload supply. Building structures required for nuclear plants whose protective function means they are classified as safety-related, have to meet particular construction requirements more stringent than those involved in conventional construction. This book gives a comprehensive overview from approval aspects given by nuclear and construction law, with special attention to the interface between plant and construction engineering, to a building structure classification. All life cycle phases are considered, with the primary focus on execution. Accidental actions on structures, the safety concept and design and fastening systems are exposed to a particular treatment. Selected chapters from the German concrete yearbook are now being published in the new English "Beton-Kalender Series" for the benefit of an international audience. Since it was founded in 1906, the Ernst & Sohn "Beton-Kalender" has been supporting developments in reinforced and prestressed concrete. The aim was to publish a yearbook to reflect progress in "ferro-concrete" structures until - as the book's first editor, Fritz von Emperger (1862-1942), expressed it - the "tempestuous development" in this form of construction came to an end. However, the "Beton-Kalender" quickly became the chosen work of reference for civil and structural engineers, and apart from the years 1945-1950 has been published annually ever since.

Nuclear Power Plant Development covers the intricacies of developing a nuclear power plant project from a construction and legal standpoint. It deals with structuring, drafting, and negotiating a wide range of standard and specialised contracts relating to the

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development of nuclear power-generation projects and also covers the other forms of power-generating facilities. It covers the forms of contract, the law involved internationally, and potential areas of pitfalls and how to avoid them in a systematic format covering various forms of projects. It is suitable for solicitors and barristers involved in the contracting for such facilities and the handling of litigation related to them, government officials involved in the commissioning and development of nuclear facilities for regional governments, and engineers and contractors involved in the actual work of design and contract administration and dispute resolution.

When Consumers Power's plan to build a nuclear power plant in Midland, Michigan, was announced in 1967, it promised to free Michigan residents from expensive, dirty, coal-fired electricity and to keep Dow Chemical operating in the state. But before the plan could be completed, the facility was called an engineering nightmare, a financial disaster, a construction boondoggle, a political headache, and a regulatory muddle. Most locals had welcomed nuclear power eagerly. Why, after almost twenty years and billions of dollars, did this promise of a high-tech, coal-free, prosperous future fail? And what lessons does its failure offer today as Americans try to develop a clean energy economy based on renewable power? To answer these questions, energy consultant and author LeRoy Smith carefully traces the design and construction decisions made by Consumers Power, including its choice of reactor and its hiring of the Bechtel Corporation to manage the project. He also details the rapidly changing regulatory requirements and growing public concern about the environmental risks of nuclear power generation. An examination of both the challenges and importance of renewable energy, this book will be of value to anyone interested in grappling with the complexities of our ongoing efforts to eliminate fossil fuels in favor of clean renewable energy.

The construction of nuclear power plants in the United States is stopping, as regulators, reactor manufacturers, and operators sort out a host of technical and institutional problems. This volume summarizes the status of nuclear power, analyzes the obstacles to resumption of construction of nuclear plants, and describes and evaluates the technological alternatives for safer, more economical reactors. Topics covered include Institutional issues--including regulatory practices at the federal and state levels, the growing trends toward greater competition in the generation of electricity, and nuclear and nonnuclear generation options. Critical evaluation of advanced reactors--covering attributes such as cost, construction time, safety, development status, and fuel cycles. Finally, three alternative federal research and development programs are presented.

This vital reference is the only one-stop resource on how to assess, prevent, and manage severe nuclear accidents in the light water reactors (LWRs) that pose the most risk to the public. LWRs are the predominant nuclear reactor in use around the world today, and they will continue to be the most frequently utilized in the near future. Therefore, accurate determination of the safety issues associated with such reactors is central to a consideration of the risks and benefits of nuclear power. This book emphasizes the prevention and management of severe accidents, in order to teach nuclear professionals how to mitigate potential risks to the public to the maximum extent possible. Engineers, researchers, students and the personnel of vendors, safety authorities and nuclear power generation organizations require the knowledge offered by this volume's globally renowned experts to ensure they obtain a core competency in nuclear safety. Organizes and presents all the latest thought on LWR nuclear safety in one consolidated volume, provided by the top experts in the field, ensuring high-quality, credible and

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easily accessible information Explains how developments in the field of LWR severe accidents have provided more accurate determinations of risk, thereby shedding new light on the debates surrounding nuclear power safety, particularly in light of the recent tragedy in Japan Concentrates on prevention and management of accidents, developing methodologies to estimate the consequences and associated risks Nuclear submarine design resources at the shipyards, their suppliers, and the Navy may erode for lack of demand. Analysis of alternative workforce and workload management options suggests that the U.S. Navy should stretch out the design of the next submarine class and start it early or sustain design resources above the current demand, so that the next class may be designed on time, on budget, and with low risk. Successfully Measure the Benefits of Green Design and Construction Sustainability in Engineering Design and Construction outlines the sustainable practices used in engineering design and construction operations for all types of engineering and construction projects. Aimed at ushering the engineering and construction industry into embracing sustainable practices and green construction techniques, this book addresses sustainability in engineering design and construction operations from a historical and global perspective, and delves into specific sustainability concepts and processes. The book explains the concepts of sustainable development, corporate social responsibility (CSR), the Dow Jones Global Sustainability Index (DJGSI), key performance indicators (KPIs), corporate sustainability, and the triple bottom line (economic, environmental, and social values in design and construction). Relevant to sustainability in every facet of engineering and construction, it also covers life-cycle environmental cost analysis, discusses sustainable engineering and site selection, the economic considerations evaluated when making sustainability decisions, and explains how to measure and quantify sustainable performance and apply these practices in the real world. It also covers project and corporate level sustainability practices, sustainable construction materials and processes, sustainable heavy construction equipment, traditional and alternative energy sources, provides implementation resources for starting and evaluating sustainability programs, and includes a checklist for measuring the sustainability of construction operations. The text contains detailed information on sustainable construction materials and processes, heavy construction equipment, and traditional and alternative energy sources. It presents information on sustainable designs, selecting sustainable sites, designing for passive survivability, designing for disassembly, and the ISO 14,000 standards. It provides implementation resources for starting and evaluating sustainability programs and a checklist for measuring the sustainability of construction operations In addition, it provides definitions of sustainability terms and expressions, as well as case studies, examples, discussion questions, and a list of supplemental references at the end of each chapter. This book provides information on: Definitions for sustainability terms Sources for locating global sustainability requirements Current sustainability issues Environmental laws related to sustainability and their implications Sustainable design Life-cycle cost assessment models Sustainable practices currently being used in the engineering and construction (E&C) industry Corporate-level sustainability practices Project-level sustainability practices Global sustainability trends and implications Sustainable materials Sustainable heavy construction equipment Traditional and alternative energy sources LEED Green Building Rating System Sustainability organizations and certification programs Sustainability implementation resources A summary of sustainable engineering design and construction

The Safeguards-by-Design (SBD) approach incorporates safeguards into the design and construction of nuclear facilities at the very beginning of the design process. It is a systematic and structured approach for fully integrating international and national safeguards for material control and accountability (MC & A), physical protection, and other proliferation barriers into the design and construction process for nuclear facilities. Implementing SBD is primarily a project management or project coordination challenge.

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This paper focuses specifically on the design process; the planning, definition, organization, coordination, scheduling and interaction of the safeguards experts and stakeholders as they participate in the design and construction of a nuclear facility. It delineates the steps in a nuclear facility design and construction project in order to provide the project context within which the safeguards design activities take place, describes the involvement of the safeguards experts in the design process, the nature of their analyses, interactions and decisions, and describes the documents created and how they are used. This report highlights the project context of safeguards activities, and identifies the safeguards community (nuclear facility operator, designer/builder, state regulator, SSAC and IAEA) must accomplish in order to implement SBD within the project.

Chapters are included on generation system descriptions and alternative energy sources; load forecasting and growth projections; utility studies, program development, and analytical models; organizational alternatives and contract arrangements; project control in the design and construction phase; site management activities; construction activities; and startup and testing.

This book provides a general introduction to the topic of buildings for resistance to the effects of abnormal loadings. The structural design requirements for nuclear facilities are very unique. In no other structural system are extreme loads such as tornadoes, missile and loud interaction, earthquake effects typical in excess of any recorded historical data at a site, and postulated system accident at very low probability range explicitly, considered in design. It covers the whole spectrum of extreme load which has to be considered in the structural design of nuclear facilities and reactor buildings, the safety criteria, the structural design, the analysis of containment. Test case studies are given in a comprehensive treatment. Each major section contains a full explanation which allows the book to be used by students and practicing engineers, particularly those facing formidable task of having to design complicated building structures with unusual boundary conditions.

Physics of Nuclear Reactors presents a comprehensive analysis of nuclear reactor physics. Editors P. Mohanakrishnan, Om Pal Singh, and Kannan Umasankari and a team of expert contributors combine their knowledge to guide the reader through a toolkit of methods for solving transport equations, understanding the physics of reactor design principles, and developing reactor safety strategies. The inclusion of experimental and operational reactor physics makes this a unique reference for those working and researching nuclear power and the fuel cycle in existing power generation sites and experimental facilities. The book also includes radiation physics, shielding techniques and an analysis of shield design, neutron monitoring and core operations. Those involved in the development and operation of nuclear reactors and the fuel cycle will gain a thorough understanding of all elements of nuclear reactor physics, thus enabling them to apply the analysis and solution methods provided to their own work and research. This book looks to future reactors in development and analyzes their status and challenges before providing possible worked-through solutions. Cover image: Kaiga Atomic Power Station Units 1 – 4, Karnataka, India. In 2018, Unit 1 of the Kaiga Station surpassed the world record of continuous operation, at 962 days. Image courtesy of DAE, India. Includes methods for solving neutron transport

problems, nuclear cross-section data and solutions of transport theory Dedicates a chapter to reactor safety that covers mitigation, probabilistic safety assessment and uncertainty analysis Covers experimental and operational physics with details on noise analysis and failed fuel detection

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