



An Overview of Important Regulatory Aspects to Be Considered in Nuclear Power Plant Construction

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Abstract

The construction of complex and large industrial facilities must be done with criteria and care, following requirements of engineering codes and design bases. Construction of this type of installation sometimes requires time, at least five to six years, and rigorous monitoring and project management. The decision to implement nuclear power plants involves a rigorous nuclear licensing process involving, currently, the phases of site approval, construction, authorizations for the use of nuclear material, initial operation, permanent operation, periodic safety review, life extension and finally, decommissioning. In Brazil, the standard of the National Nuclear Energy Commission, NN 1.04, regulates these nuclear licensing activities. However, this standard does not go into detail regarding construction activities. This construction phase starts after the approval, by regulator, of a document called the Preliminary Security Analysis Report (PSAR). This document describes the general characteristics of the site, the type of reactor, its associated equipment and systems, testing requirements, accident analysis, technical specification, and quality assurance, among other topics. The nuclear power plant must be built in compliance with this document, the design bases and codes and standards. There is ample room for the development of regulatory requirements associated with the activities of construction of nuclear power plants, especially with regard to works with long delays for the completion of the construction phase, including the care to be taken to preserve already installed equipment, activities of preventive maintenance, aging degradation control, up to construction continuity management and commissioning phases. Properly performed construction meeting design and regulatory requirements is intended to ensure that newly constructed structures, systems and components can be commissioned and operated safely. It should be considered that all construction activities have a potential impact on safety, even if there is no nuclear material present during construction. The present work has the objective to present an overview of the main activities inherent to the construction of nuclear power plants and proposal of regulatory requirements to be applied in the construction phase of Brazilian nuclear power plants, considering the main technical references provided by the IAEA and for the regulatory experience gained through regulatory activities in the construction and commissioning of the Angra 2 nuclear power plant and the Dry Irradiated Nuclear Fuel Storage Unit (UAS). Wide emphasis is given to aspects of Safety Culture, Quality Assurance, Commissioning and transition from construction to operation phase.

Keywords: construction, commissioning, safety culture, quality assurance, aging degradation

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