

# **SELECTIVE METHODS for the MAINTAINABILITY and STANDARIZATION of the ENGINEERING of a RESEARCH REACTOR**

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## **ABSTRACT**

The main point of this work consists of a selective method for the engineering of a research reactor based on parameters, which determine a safer design, installation, operation and maintenance. The variety of tasks in a research reactor are: research, development, production of radioisotopes, etc. They are developed within the installation and the different specialties gathered for these activities. It is necessary to count on an intrinsically safe environment, from the point of view of the investigator, the operator and the maintenance personnel.

In general, in both nuclear and conventional installation, independent of its size, certain investment necessities prevail, starting from its design, such as: Nuclear Security, Engineering, Versatility, Production (both for investigation and development), Conventional Security and Physical Protection, Profitability, etc.

The concepts which help us accentuate a greater benefit for the research are not found within these parameters, purpose for which this facility was created. When obtaining a simple engineering the results show an increase in security, decrease in maintenance and operative costs, less ageing and an easy operation.

The plant engineering of research reactors could be titled, from the engineering and maintenance point of view, as a technological chaos. Not only for its aspect but for its physiognomy too: inaccessible to certain areas; impassable in its circulation aisles; hard to check and measure; disassemble; clean its components; thus increasing unnecessarily the personnel's exposure time.

The facilities of research reactors have different disciplines used as rules for the development of the design, such as nuclear, mechanical, thermodynamical, electronic, chemical, electrical, etc. Common guide lines – from design to operation -are non-existent. This is why different manufacturers and models are found within instruments, pumps, electrical engines, illumination, etc... even when they perform the same function in each specialty. These diversities bring about conflicts and confusion between the maintenance and operation crew, besides modifying dangerously the fail rate and thus the overall reliability of the reactor.

The maintainability is the capacity of being maintained an equipment/system has, serving as a design parameter. A system must be designed in a way in which it is maintained without a great investment of time and with low costs, minimum environmental impact and the least resources possible.

Standardization is the action of normalizing the engineering of all systems/equipments of the reactor from its design, in all the disciplines, (mechanical, electrical, electronic, chemical, etc.) taking into consideration the facility of its maintenance and conserving or increasing the reliability of the system.

The intention of this Program of Maintainability and Standardization in Research Reactors is based on procedures and calculations to improve the reliability of the equipments/systems according to pre-established criterion.