METHODOLOGY REVIEW FOR THE AGEING EVALUATION AND DEFINITION OF CODES ON SAFETY OF RESEARCH REACTORS

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The ageing phenomenon is a general process that occurs in all kind of installation in different ways and intensities depending on a large spectrum of causes. In Research Reactors technological ageing and natural physical ageing associated to utilization or decay are present in most of items. In this way the main objective of this project is to manage this effect to preserve the installation integrity.

The IEA-R1 reactor is a pool type, light water moderated and graphite reflected research reactor located at IPEN-CNEN/SP, in the city of São Paulo, Brazil. The first start-up was on September 1957. Although designed to operate at 5 MW, this reactor operated until 1997 at a power level of 2 MW mainly for basic and applied research, as well as in experimental production of radioisotopes for medicine, industry and life sciences applications. Due to the recent growth of radioisotope demand in Brazil in the eighties for medical diagnosis and therapies, IPEN had decided since that time to increase the reactor power level to 5 MW and to operate the reactor continuously. Studies and ageing management self assessment of IEA-R1-IPEN research reactor were conducted following IAEA recommendations contained in the Technical Report 338: Methodology for the Management of Ageing of Nuclear Power Plant Components Important to Safety, in the TECDOC 792: Management of Research Reactor Ageing and in the IAEA - Service Series - Guidelines for the Review or Research Reactor Safety. The main objectives were: to perform studies and assessments about the entire IEA-R1 reactor; to carry out ageing management self assessment studies with the purpose of introducing an Ageing Management Program as part of the operational procedures. The self-assessment studies resulted in the identification of critical components for the ageing management program and also, recommendations for the improvement of the Inspection and Testing Plan and organization of engineering documents, records and procedures were included. In addition, the two heat exchangers, the two primary pumps and the reactor data acquisition systems were selected to be monitored during the development of the project.

The ageing studies carried out have provided useful information on the present status of the components of the system, for instance, identifying the major repairs and refurbishing requirements for primary coolant systems. The following activities were performed in this project:

A) Interim ageing studies:
A.1. Review of existing information relating to the understanding of components ageing
A.2. Documentation of current understanding of component ageing and associated data needs.
A.3. Review of current methods for monitoring and mitigation of ageing.
A.4. Report of interim ageing assessment and recommendations.
B) Comprehensive ageing studies:
B.1. Studies on understanding ageing
B.2. Studies on monitoring ageing
B.3. Studies on mitigation of ageing
B.4. Report: Assessment of ageing and recommended application of results: -Understanding ageing; -Monitoring ageing; -Mitigate ageing. This work was conducted as part of a Latin America regional collaborative project supported and coordinated by the International Atomic Energy Agency as a ARCAL project. The participating countries were Argentine, Brazil, Chile, Mexico and Peru.

On balance, this project has been focused in an effort to create a regional knowledge base and to deepen the study about ageing mechanisms and common problems to all countries participating in this project. The main results has been on ageing studies about the components chosen to be monitored and the development of a common methodology as well as the associated standards to guide the management of the ageing problem.