present work is to review the design of the primary system piping supports taking into account the current conditions after the changes and refurbishment.

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STRUCTURAL DESIGN OF A BURIED CONSTRUCTION BUNKER TYPE, INTENDED FOR THE INSTALLATION OF LINEAR ACCELERATOR EQUIPMENT OF ELECTRONS

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External radiotherapy occupies a prominent place in cancer treatments. The constructions of the linear accelerators of electronics bunkers are costly and this factor is limiting so that more equipment is installed. It is necessary to research constructive options with the objective of reducing costs, without loss of the guarantee of structural stability and radiological protection as a barrier. In the screening study of these facilities, various materials may be employed for radiation attenuation. Reinforced concrete is used in many of these facilities, either for its cost or the constructive facility in Brazil, due to the knowledge of this material. The objective of this study was to design and analyze a bunker buried in reinforced concrete and as a comparative of costs the structure of an ungrounded bunker was also designed, also in reinforced concrete. Some advantages and disadvantages of each structural system were indicated, as well as the costs of the basic structure of two models. The structure of the walls, accesses, slabs, beams and pillars, as well as foundations, in terms of cost, has the ratio of 4 times the bunker not buried to the buried bunker, a significant value in the installation of a radiotherapy service.

INSTRUMENTED FUEL ASSEMBLY

P79

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The flow rate in the channel between two fuel assemblies is very difficult to estimate or measured. This flow rate is very important to the cooling process of the external plates. This work presents the project and construction of an instrumented fuel assembly with the objectives of perform more accurate safety analysis for the IEA-R1 reactor; determine the actual cooling conditions (mainly in the outermost fuel plate) and validate computer codes used for thermalhydraulic and safety analysis of research reactors. Fourteen thermocouples were installed in this instrumented fuel assembly. Four in each lateral channel, one in the inlet nozzle and one in

the outlet nozzle. There are three thermocouples in each channel to measure the clad temperature and one thermocouple to measure the fluid temperature. Three series of experiments, for three different core configuration were carried out with the instrumented fuel assembly. In two experiments a box was installed around the core to reduce the cross flow between the fuel assembly and measure the impact in the temperatures of external plates. The experimental results obtained with the instrumented fuel element are very consistent with the phenomenology involved. Given the amount of information generated and its utility in the design, improvement and qualification in construction, assembly and manufacturing of instrumented fuel, this project turned out to be an important landmark on the thermal-hydraulic study of research reactor cores. The proposed solutions could be useful for other research reactors.

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P80 THERMAL-HYDRAULIC ANALYSIS OF THE IEA-R1 RESEARCH REACTOR – A COMPARISON BETWEEN IDEAL AND ACTUAL CONDITIONS

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Thermal-hydraulic analysis were performed for the IEA-R1 research reactor considering ideal, estimated and actual flow rate conditions through the fuel elements. The ideal conditions were obtained dividing the total primary flow rate among the fuel elements and the estimated conditions were calculated using the computer program FLOW. The actual flow rate conditions were experimentally measured using an instrumented dummy fuel element. The results show that the actual conditions are far from ideal and calculated ones due to the high bypass flow that deviates the active reactor core through the irradiation devices, gaps, couplings, etc..Thus, the safety margins are smaller for the actual flow conditions.

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