P6 IEA-R1 RENEWED PRIMARY COOLANT PIPING SYSTEM STRESS ANALYSIS

A.A. Faloppa[a], G. Fainer, C.A. Oliveira and M. Mattar

[a] afaloppa@ipen.br

Nuclear and Energy Research Institute, São Paulo, Brazil

A partial replacement of the IEA-R1 piping system was conducted in 2014. The aim of this work is to perform the stress analysis of the renewed primary piping system of the IEA-R1, taking into account the as built conditions and the pipe modifications.

The nuclear research reactor IEA-R1 is a pool type reactor designed by Babcox-Willcox, which is operated by IPEN since 1957.

The primary coolant system is responsible for removing the residual heat of the Reactor core. As a part of the life management, a regular inspection detected some degradation in the primary piping system. In consequence, part of the piping system was replaced. The partial renewing of the primary piping system did not imply in major piping layout modifications. However, the stress condition of the piping systems had to be reanalyzed.

The structural stress analysis of the primary piping systems is now presented and the final results are discussed.

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P7 REFURBISHMENT OF THE IEA-R1 PRIMARY COOLANT SYSTEM PIPING SUPPORTS

A.A. Faloppa[a], G. Fainer, C.A. Oliveira and M. Mattar

[a] afaloppa@ipen.br

Nuclear and Energy Research Institute, São Paulo, Brazil

This paper presents the study and the structural analysis of the IEA-R1 primary circuit piping supports, considering all the changes involved in the piping system replacement conducted in 2014.

The IEA-R1 is a nuclear reactor for research purposes designed by Babcox-Willcox that is operated by IPEN since 1957. The reactor life management and modernization program is being conducted for the last two decades and already resulted in a series of changes, especially on the reactor coolant system. This set of components, divided in primary and secondary circuit, is responsible for the circulation of water into the core to remove heat.

In the ageing management program that includes regular inspection, some degradation was observed in the primary piping system. As result, the renewing of the piping system was carried out in 2014. Moreover the poor condition of some original piping supports gave rise to the refurbishment of all piping supports. The aim of the

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

P75

P. Almeida[a] and C.A. Zeitune

[a] pmsp.patricia@gmail.com

Nuclear and Energy Research Institute, São Paulo, Brazil

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

P.E. Umbehaun[a], D.A. Andrade, W.M. Torres and W. Ricci

[a] umbehaun@usp.br

Nuclear and Energy Research Institute, São Paulo, Brazil

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