ANALYSIS AND PROJECT OF THE HIGH DENSITY STORAGE RACKS FOR SPENT FUEL OF THE RESEARCH REACTOR IEA-R1

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The IEA-R1 research reactor works 40h weekly with 4.5 Mw power. The storage rack for spent fuel elements has less than half of its initial capacity. Under these conditions (current conditions of reactor operation 32h weekly will have 3 spend fuel by year, then, approximately 3 utilization rate Positions/year). Thus, we will have only about six years of capacity for storage. Whereas the desired service life of the IEA-R1 is at least another 20 years, it will be necessary to increase the storage capacity of spent fuel. Hence, it is necessary to double the wet storage capacity (storage in the IEA-R1 reactor's pool). After reviewing the literature about materials available for use in the construction of the new storage rack with absorber of neutrons, the BoralcanTM (manufactured by 3M) was chosen, due to its properties.

This work presents studies: (a) for the construction of new storages racks with double of the current capacity using the same place of current storages racks and (b) criticality analysis using the MCNP-5 code. Two American Nuclear Data Libraries were used: ENDF / B-VI and ENDF / B-VII, and the results obtained for each data bases were compared. These analyzes confirm the possibility of doubling the storage capacity of fuel elements burned in the same place occupied by the current storage rack attending to the IEA-R1 reactor needs and attending the safety requirements according to the National Nuclear Energy Commission – CNEN and the International Atomic Energy Agency (IAEA). To calculate the keff new fuel elements (maximum possible reactivity) used in full charge of the storage rack were considered. With the results obtained in the simulation we can conclude that doubling the amount of racks for spent fuel elements are complied with safety limits established in the IAEA standards and CNEN of criticality (keff <0.95). It is mandatory to use neutron absorber material.

Key words: Spent fuel storage, MCNP-5, Boron