

# SPENT FUEL ASSESSMENT, ISOLATION OF LEAKERS, STUDIES WITH CORROSION COUPONS AND PREPARATIONS FOR SHIPMENT ABROAD

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## Introduction.

IEA-R1 is a pool type, light water moderated, and graphite reflected research reactor. It is located at the "Instituto de Pesquisas Energéticas e Nucleares" IPEN, which is part of the Brazilian Nuclear Energy Commission. This reactor was designed and built by Babcock & Wilcox Co. in accordance with specifications furnished by the Brazilian Nuclear Energy Commission, and financed by the US Atoms for Peace Program. The first criticality in this reactor occurred on September 16<sup>th</sup>, 1957, and was the first such event in South America. Although designed to operate at 5 MW, IEA-R1 has been operating at 2 MW since the beginning. This reactor has been used for research in nuclear and solid state physics, radiochemistry and radiobiology, production of some radioisotopes and to provide irradiation services to the scientific community and also to industry.

Since startup, 181 core configurations have been installed and around 150 fuel assemblies (FAs) used. The reactor operated 40 hours per week (8 hours/day) during most of its life time, but since 1996 is operating in one continuous cycle of 64 hours per week. In terms of the fuel used in this reactor, four stages can be visualized:

The first stage corresponds to the first core of the reactor. It was composed of U-Al alloy fuel with 20wt% enrichment. Each fuel had 19 curved fuel plates produced by B&W. These FAs failed in the very early stage of the reactor operation, due to pitting corrosion caused by the brazing flux used to fix the fuel plates to the support plates. These fuels were replaced, in 1958, by new ones, also produced by B&W. This second batch of FAs were identical to the earlier ones (U-Al alloy, 20wt% enrichment, 19 curved fuel plates) but brazing was not used for assembling. The fuel plates were fixed mechanically to the support plates. These fuels performed well up to the discharge burnup used at that time.

