

Operation of the Argonauta Reactor

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The Argonauta is a projected reactor of research for the Argonne National Laboratory and that it had its construction initiated in July of 1960, by company CBV Ltda, in the Ilha do Fundão, in Rio de Janeiro, using the biggest possible number of existing components at the time in the national market [1]. Its first criticality was reached to the 20 of February of 1965.

The reactor has a core with very flexible geometry and was projected to operate to low the power, allowing, therefore, easy access to its experimental facilities.

In the current configuration of the core, with one fuel load, the reactor can reach a power of peak of 1 KW, for 1 hour of operation and 500 W of maximum power, for a continuous operation[1]. Usually, it operates the power of 170 and 340 W.

In these 47 years the reactor has being coming satisfactorily operating, destined to the research and development in Reactor Physics, irradiation of samples, tests of materials and training, aiming at the specialization in nuclear science and technology, being the inherent security its main characteristic.

Currently, a special emphasis has being given to the development of non destructive techniques of analysis as the computerized tomography and neutron radiography, using itself the beam of thermal neutrons of its main irradiation duct.

Since its inauguration until the gift the Argonauta reactor suffered diverse modifications and new implementations in its systems from instrumentation and control and two reforms in its combustible nucleus. Its installations and laboratories also passed for some modifications, reforms and implementations, aiming at the modernization, the increase of the security and the adequacy to the new national and international norms.

Specifically, during the last biennium they had been carried through: reform of the entrance hall of the reactor; partial paint of the great hall and entrance hall of the reactor; reform of the cooling tower; reform of air conditioning machines; small services

of building maintenance; modernization of some computers and acquisition of computers components; acquired for importation a dual 5 kV detector bias supply and a spectroscopy amplifier and, in the national market, a image plate: accessory screen BAS-IP 2040, a scan maker 9800 XL, a thermostatic bath and diverse materials of consumption for replacement and maintenance of the installations and equipments.

Carried through operations:

Since February of 1965, year of its inauguration, until December of 2012, 5681 operations with the reactor had been carried through, with 15,814 total hours of operations.

During the biennium 2011-2012, 179 operations with reactor, being 101 in 2011 and 78 in 2012, had been carried through, totalizing 547:00 hours of operations, of which 362:46 hours in criticality conditions.

Beyond the tests with the purpose of maintenance and survey of operational parameters of the reactor, diverse internal and external customers had been taken care of with these operations during the biennium.

Internal customers: DIRA (Divisão de Radiofármacos), SEESC (Serviço de Engenharia de Sistemas Complexos), SEREA (Serviço do Reator Argonauta) and PPGIEN (Programa de Pós-Graduação do IEN);

External customers: COPPE, UFRJ, IME, UERJ, CNEN/SESAL and Química Futura Ltda.

Samples irradiated:

99 of Au, 12 of KBr, 87 of Dy and 29 of Mn.

Carried through experiments with operations associates:

49 neutron radiographies for development and thesis and 19 neutron radiographies for external customer (Química Futura Ltda).

Training and lessons of graduation, after-graduation with operations associates:

20 practical lessons for the course of Msc. of the IME, 06 practical lessons for the course of Medical Physics of the IF/UFRJ, 04 practical lessons for the course of Msc. of the COPPE/UFRJ and 02 practical lessons for the course of Msc. of the PPGIEN/IEN, including 32 operations with the Argonauta reactor.

References

- [1] Manual de Construção e Operação do Reator Argonauta, RAS vol. 1, 1989.