

## **Development of the Brazilian Calibration Network for radiodiagnostic dosimetric and quality control equipment.**

Peixoto, J. G. P.

The National Ionizing Radiation Metrology Laboratory (LNMRI) of the Radioprotection and Dosimetry Institute (IRD), an Institute of the National Nuclear Energy Commission (CNEN) is designated by the Brazilian Government through the National Institute for Metrology (INMETRO) to maintain the national ionizing radiation dosimetry standards and to disseminate the corresponding quantities.

The implementation of health improvement programs is the Brazilian Government primary goal. Some of these programs are related to the medical applications of the ionizing radiation and this is so important that it is part of the main strategic planning of the following institutions involved in this subject:

- National Sanitary Inspection Agency (ANVISA);
- National Nuclear Energy Commission (CNEN);
- Health Ministry (MS).

In order to regulate the quality control and inspection of such applications, the Health Ministry established the regulation Portaria MS 453. Hospitals and clinics, that use X-ray for medical diagnostics must routinely apply quantity programs and controls. In parallel, each State body for sanitary inspection is implementing the compliance control and adherence to this regulation. For this decentralized control there is great demand for equipment acquisition and staff training all over Brazil.

Many Universities are implementing graduation and post-graduate courses in order to cover the lack of specialized personnel at ANVISA, hospitals and service companies for running this program.

The LNMRI provides traceable standards in radiation therapy, diagnostic radiology and radiation protection and coordinates the Brazilian metrology network for ionizing radiation in diagnostic radiology and radiation protection. The objective of the network is to develop all Brazilian diagnostic metrology centers, to take care of the implementation of the legal dosimetric, kVp and exposure time measurement units in accordance to the scientific progress of metrology and international agreements. Thanks to the LNMRI participation at the CCRI meetings, the Brazilian metrology network is connected to the latest developments in the respective areas.

In order to attend the great demand for calibration and type test of all equipment in use all over the country, it is necessary to have calibration and test laboratories preferentially located in those regions where there are higher number of instrument in operation, that means, the Southeast and Northeast regions . The Brazilian metrology centers are ( see map):

- Radioprotection and Dosimetry Institute (IRD), Rio de Janeiro;

- Radiologic Sciences Laboratory (LCR), Rio de Janeiro
- Nuclear Energy Research Institute (IPEN), São Paulo;
- Electric Engineering Institute (IEE), São Paulo;
- Nuclear Technology Development Center (CDTN), Belo Horizonte;
- Regional Nuclear Sciences Center (CRCN), Recife;
- Department of Nuclear Engineering (DEN/UFPE), Recife;

The metrology network is being equipped with the following instruments:

- 3 PTW transmission chamber;
- 5 high precision thermometer;
- 6 Dynalyser;
- 9 Keithley electrometer 6517A;
- 16 laser;
- 6 barometer;
- spectrometer;
- mammograph system;
- 3 climatic chamber;
- 20 ionization chamber for diagnostic;
- 2 x-ray system and other x-ray tube;
- Cs-137 bucker;
- high precision multimeter;
- filters (Al, Mo, Rh, Cu and Pd).

The network is being financed by the Brazilian Government institution for projects funding (FINEP), International Agency Energy Atomic (IAEA) and CNEN itself. More than US\$ 500,000.00 was already invested in equipment (ionization chambers, x-ray systems, dynalysers, electrometers and so on) and training the staff members involved, through training courses, workshops fellowships and scientific visits.

CNEN's strategic planning, which is part of the Brazilian Government long term strategic plan, covers two items specifically directed to metrology and quality control of the use of ionizing radiation:

- 1 – To make available on the market products and services which are adequate and technologically updated;
- 2 – To improve the level of the nuclear measurements.

This is an evidence of the importance of this subject for the Brazilian Government.

