

# Measurement Laboratories

*Mário João Capucho dos Reis*

The Measurement Laboratories (LM) provides analytical services in the area of radioactive analysis of low and medium activity samples and in measurement of ions in liquid samples.

Together with the Environmental Radioactivity Group (GRA), which is responsible for collection, chemical preparation of the samples and data organization, the LM carries out Portugal's obligations under Article 35 of the EURATOM Treaty which requires member states to conduct national environmental radiological survey annually.

The LM is also involved in research work and provides analytical services to external clients in order to support industrial and commercial activities.

The techniques used are high resolution gamma-ray spectrometry; gross alpha/beta counting and beta counting of specific radionuclides using gas flow proportional counters; liquid scintillation and alpha spectrometry. The range of radioactivity measurements includes: analysis of radioisotopes in water to assist in the surveillance of ITN's research reactor, control of foodstuffs, export or import products and building materials, analysis of gross alpha/beta and tritium in drinking water (in collaboration with the GRA).

Regarding the external quality control of the measurements, during 2011 the LM group has participated, together with the GRA, in several International Intercomparison Exercises: determination of specific radionuclides in soil and water (IAEA/ALMERA, organized by IAEA), determination of  $^{137}\text{Cs}$ ,  $^{90}\text{Sr}$  and  $^{40}\text{K}$  in wild bilberry (IRMM/Geel, organized by EC) and determination of natural and artificial nuclides, gross alpha/beta and tritium in water (CSN/Spain, organized by CSN). Furthermore, the Gamma Spectrometry Laboratory has also participated in a gamma spectrometry

Proficiency Test Exercise covering two different matrices: determination of unknown nuclides in an aqueous sample and determination of  $^{60}\text{Co}$ ,  $^{137}\text{Cs}$ ,  $^{234,235,238}\text{U}$  and  $^{241}\text{Am}$  in a synthetic sand sample. The Proficiency Test was organized by the National Physical Laboratory (NPL, UK).

Regarding the Quality Assurance System, an important step was done towards the accreditation of several radioanalytical techniques: gross alpha/beta in waters using Proportional Counters and Liquid Scintillation Counting, tritium in waters by Liquid Scintillation Counting and Gamma Spectrometry of liquid and solid samples using HPGe detectors. Internal audits were carried out during this year and the accreditation concession audit, conducted by the Portuguese Accreditation Body (IPAC), took place on December.

The LM continues to collaborate with several ongoing projects, mainly by providing different type of measurements: radiological characterization of soil and rock samples and measurement of radioactive stratospheric tracers.

During 2011, the Measurements Laboratories team was involved in education and training activities, namely by lecturing in training courses for external entities and by providing advanced training on radioactivity measurements to foreigner IAEA students.

Throughout the year, the Measurement Laboratories also received a great number of study visits, mainly from groups of students of secondary schools and universities.

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## Research Team

### Researcher

M. REIS (75%), Aux., Group Leader

### Student

G. CARVALHAL, FCT grant

### Technical Personnel

G. SILVA  
J. ABRANTES  
J.M. OLIVEIRA (30%)  
L. SILVA

**Accreditation of radioanalytical techniques***J. Abrantes, G. Carvalhal, M. Reis, L. Silva, G. Silva*

During 2011 a great effort was undertaken in order to finish the preparation for the accreditation of several radioanalytical techniques: gross alpha/beta in water samples using Proportional Counters and Liquid Scintillation Counting, tritium in water by Liquid Scintillation Counting and Gamma Spectrometry of liquid and solid samples using HPGe detectors. All the management and technical procedures were revised and updated and an internal quality audit was carried out. On December, a two days accreditation concession audit was conducted by experts of the Portuguese Accreditation Body (IPAC) to verify the fulfillment of the ISO/IEC 17025 requirements.

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**Education and training of IAEA fellows***J. Abrantes, G. Carvalhal, M. Reis*

During the second half of October 2011, two trainees (as IAEA financed fellows) from the Radiation Protection Center of Lithuania (Department of Expertise and Exposure Monitoring, Division of the Public Exposure Monitoring) were received by the Measurements Laboratory (LM) and Environmental Radioactivity Group (GRA) for a training programme. The aim of the technical training consisted on measuring of gross alpha/beta activities in waters by Gas Proportional Counters and Liquid Scintillation Counting as well as radon activity in waters by Liquid Scintillation Counting. At LM the topics included on the training programme were: alpha/beta detection systems, calibration processes, MDA and uncertainty calculations, related activity calculations and results.

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**Fukushima related radioactivity measurements***L. Silva, M. Reis*

Following the Fukushima NPP accident in March 2011, a set of different type of samples were measured by high resolution gamma spectrometry to rapidly detect the presence of anthropogenic nuclides that could be related to the accident. Samples of aerosol particles, leafy vegetables, milk, rain water and grass were measured and it was possible to detect traces of radioactive isotopes of iodine, cesium and tellurium in very low levels but clearly related to the Japan NPP accident.

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**SERVICES****Analytical services on radioactivity measurements***J. Abrantes, G. Carvalhal, J.M. Oliveira, M. Reis, L. Silva, G. Silva*

In 2011, more than 2000 analysis have been performed (excluding analysis for calibration, quality control and intercomparison exercises). The above mentioned analysis were carried out in the framework of the national environmental radiological survey, as services for external entities and for research projects, either of UPSR or other ITN sectors. During this year, as a consequence of the Fukushima NPP accident, several measurements of foodstuffs and related items imported from Japan were carried out by request of the Portuguese competent authorities, in order to detect eventual contaminations.