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Institute for Reference Materials and Measurements
IRMM
JRC Reference Laboratory for Radionuclide Metrology

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Laboratory Report 2003-2005 of IRMM

The years 2003 and 2004 represent the first half of the EC-JRC's framework programme VI. With the start of this framework programme, the laboratory's tasks were extended with an action directly supporting the European Commission's policy in radioactivity monitoring such that the present work programme is comprised of five work areas:

1. Primary standardisation, i.e. providing absolute standards of radioactivity and participation in key comparisons, and determination of decay data;
2. Characterisation of Reference Materials (RMs) for their radioactive components;
3. Ultra-low level radioactivity measurements (mainly at HADES);
4. Support to international metrology organisations (BIPM/CCRI, Euromet, ICRM).
5. Development and co-ordination of an international comparison scheme in the frame of the Commission's Radioactivity Environmental Monitoring programme.

Highlights of work done during the past two years:

- Successful participation in the CCRI(II) Key-Comparisons of ^{192}Ir, ^{241}Am, ^{65}Zn, and ^{54}Mn. All results (will) make part of the respective Key-Comparison Reference Value, and be entered into the KC database of the BIPM. Additionally, we participated in the KC for ^{125}I, which is awaiting evaluation. The follow-up to the previous KC of ^{32}P just started.
- Decay data: successful contributions to EUROMET projects, determining with high accuracy new sets of alpha-particle energies and emission probabilities P_α of ^{235}U and of γ-ray emission probabilities of ^{65}Zn. A similar project to determine decay data of ^{240}Pu was initiated.
- In the course of PhD studies, software to evaluate data from digital coincidence counting has been developed and coincidence experiments have been simulated with the aim to improve the determination of extrapolation values in coincidence experiments.
- Source dryer: The production of prototype models for the preparation of thin, uniform deposits of the smallest crystal size possible has progressed but is not completed yet.
- In order to find suitable starting material for the development of CRMs to be certified for radioactive components in vegetable materials, edible mushroom samples from various European regions have been analysed for their ^{137}Cs and ^{90}Sr radioactivity content.

Retieseweg 111, B-2440 Geel, Belgium
Tel.: +32-(0)14-571 211 - Direct line: +32-(0)14-571 882 • Fax: +32-(0)14-584 273
E-mail: uwe.waetjen @ cec.eu.int • http://www.irmm.jrc.be

- The measurement of the activation of metal disks has been explored as a rugged method for the passive long-term monitoring of neutron fluence, making use of low-level γ-spectrometry in the underground laboratory HADES.
- Underground measurement of ^{60}Co in steel activated by the atomic bomb in Hiroshima was refined.
- Measurement in HADES of metal plates, which were inserted as charged particle flux monitors in the JET Tokamak, for radionuclides formed by activation or sputtered from parts of the Tokamak vessel.
- Recently, the development of the future SIR has been taken up again. A broader collaboration of IRMM and NPL with LNHB and PTB has been agreed under the framework of VERMI - the Virtual European Radionuclide Metrology Institute.
- Organisation of the 2003 international comparison of European monitoring laboratories for environmental radioactivity: gravimetrical spiking of air filters of a vast diversity with standardised ^{137}Cs solution and evaluation of results.
- Organisation of the 2004 international comparison with ^{40}K, ^{90}Sr and ^{137}Cs in milk powder: determination of IRMM reference values and WEB-based collection of results.

Uwe Wätjen

Retieseweg 111, B-2440 Geel, Belgium
Tel.: +32-(0)14-571 211 - Direct line: +32-(0)14-571 882 • Fax: +32-(0)14-584 273
E-mail: uwe.waetjen @ cec.eu.int • http://www.irmm.jrc.be