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DG JOINT RESEARCH CENTRE
IRMM
Institute for Reference Materials and Measurements
JRC Reference Laboratory for Radionuclide Metrology

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2001 – 2003 Report of IRMM

The years 2001 and 2002 were the second half of the EC - JRC's framework programme V. 2003 is the first year of FP VI. The laboratory's programme was subdivided into four distinct areas:

1. Primary standardisation, i.e. providing absolute standards of radioactivity and participation in key comparisons;
2. Characterisation of RMs for their radioactive components;
3. Ultra-low level radioactivity measurements (mainly at HADES);
4. Support to international metrology organisations (BIPM/CCRI, Euromet, ICRM).

A new programme action is added for FP VI: Co-ordination of the international comparisons in the frame of the Commission's Radioactivity Environmental Monitoring programme.

Highlights of work done during the past two years were:

- Successful participation in the CCRI(II) Key-Comparisons of ^{204}Tl, ^{152}Eu, ^{238}Pu, ^{89}Sr,. 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 KCs for ^{32}P, ^{192}Ir and ^{65}Zn
- Source-Dryer: The preparation of thin, uniform, deposits of the smallest crystal size possible, from radioactive solutions is at the basis of primary standardisation work. The Source Dryer has been invented for this goal, producing excellent results. This instrument is patented. Two laboratories have ordered copies of this instrument.
- Characterisation of a NIST shell-fish reference material. Radioactivity in shell-fish needs to be assessed, as the activity concentrations in certain maritime (Irish sea, La Hague) areas are rather high. Shell-fish seems to accumulate radioactivity. The shell-fish CRM will help the responsible laboratories to provide SI-traceable, correct assessments of radioactivity in shell-fish.
- Re-certification of two IAEA RMs (milk powder and soil) for their radioactive components, for providing these with traceability to the SI. This work is nearly finished.
- Zn impurities in GaAs semiconductor material: Zn is a poison in this semiconductor material even at very low concentrations. The material was activated at HMI (Berlin), Zn chemically separated and measured in HADES. The results were excellent.
- JCO accident: The aim was to retrospectively assess the neutron fluence during the criticality accident. IRMM was asked by the Japanese investigation team to analyse table spoons from households around the site for their ^{51}Cr content. By this, a map of neutron doses of the JCO site could be established and helped the Japanese laboratory to assess the neutron dose received by the population living around the site.

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- Measurement of ^{60}Co in steel from the Hiroshima bombing. Our highly accurate results supported the model and are being included in the DS02.
- Measurement of ^{94}Nb in neutron irradiated Mo samples as part of a PhD thesis.
- Set-up of the CELLAR network of underground low-level measurement laboratories.
- Measurement of ^{210}Pb (coming from Rn) in lung tissue of German U-mine workers.
- *In vitro* Measurement of ^{210}Pb in human bones in HADES in order to better understand the distribution of ^{210}Pb and thereby improving *in-vivo* measurements.
- Measurements in HADES of construction materials for BOREXINO
- Measurements in HADES of swipe samples from ESO's environmental sampling.
- Measurement of ^{60}Co in German steel as part of a benchmarking exercise conducted by Bundesamt für Strahlenschutz
- Conceiving, developing and building (partly finished) the future World primary reference system of radioactivity.

A list of publications from the last two years is appended.

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