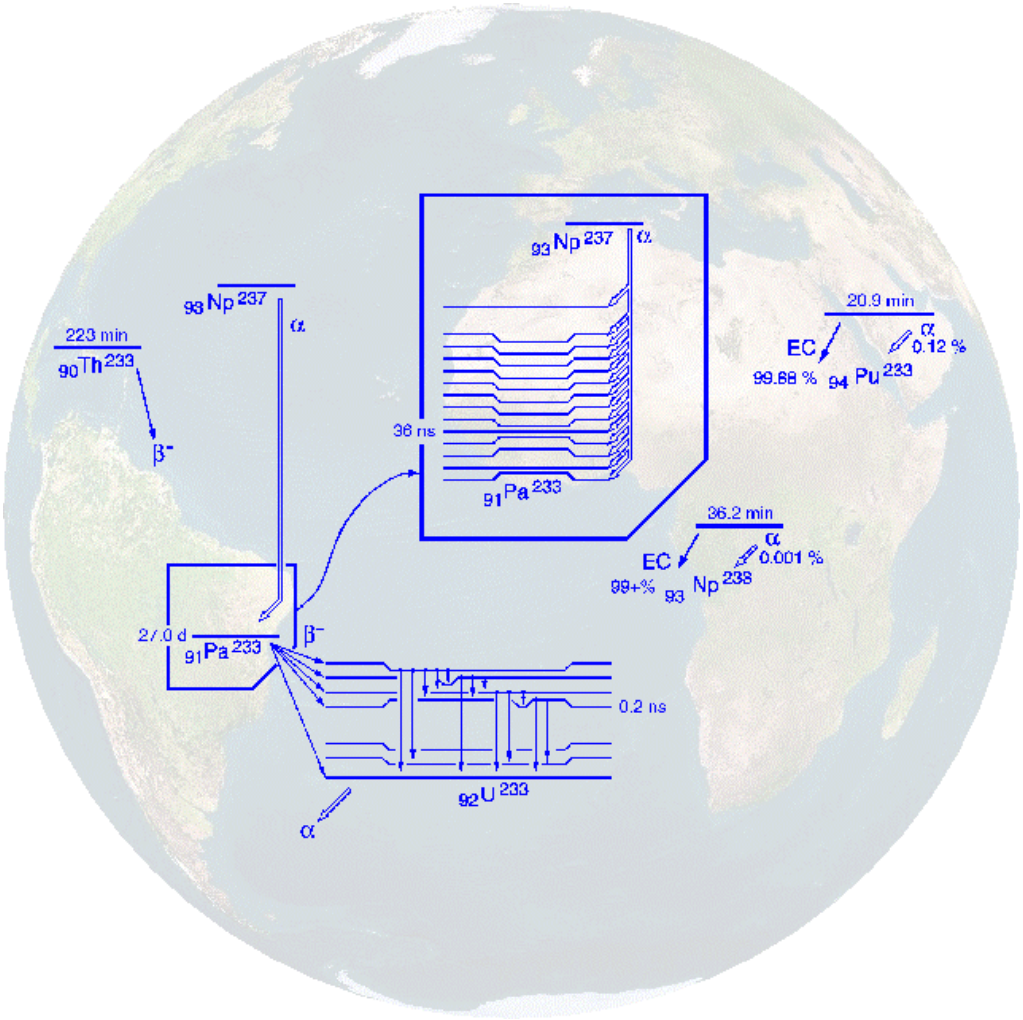
ICRM NEWSLETTER

Issue 19 - July 2005



International Committee for Radionuclide Metrology

Editor : Nelcy Coursol

LABORATOIRE NATIONAL
HENRI BECQUEREL

International Committee for Radionuclide Metrology ICRM

ICRM NEWSLETTER

Issue 19

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July 2005

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Otwock-Świerk

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- ***Romania*** • Institutul National de Fizica si Inginerie Nucleara, INFIN-HH, (SA1/SA2), Bucharest
- ***Russia*** • D.I.Mendeleyev Institute for Metrology (VNIIM), St. Petersburg
- ***Slovac Republic*** • Slovak Institute of Metrology, SMU, Bratislava
- ***Slovenia*** • Jozef Stefan Institute, Laboratory for Radiological Measuring Systems and Radioactivity Measurements, Ljubljana
- ***South Africa*** • CSIR-National Metrology Laboratory, Cape Town
- ***Spain*** • Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT, Madrid
- ***Switzerland*** • Institut universitaire de Radiophysique Appliquée, IRA/METAS, (SA1/SA2), Lausanne
- ***United Kingdom*** • National Physical Laboratory, NPL, (SA1/SA2), Teddington

EDITORIAL

This newsletter was established in response to a recommendation of the International Committee for Radionuclide Metrology made during its General Meeting in Grenoble 1985. It is meant to serve as a medium for informal exchange of information between workers active in the field of Radionuclide Metrology.

The scope of the Radionuclide Metrology Newsletter is to describe briefly current activities in the following topics :

- foil and source preparation;
- α-, β- and γ-ray spectrometry including spectrum evaluation;
- improvement and development of radionuclide measurement techniques;
- measurement and evaluation of radionuclide data;
- low-level radioactivity measurement techniques;
- life-sciences;
- quality assurance and traceability.

In order to ensure that the Newsletter is as comprehensive and informative as possible, contributions are sought from all laboratories known to be engaged in measurements and data evaluation techniques relevant to Radionuclide Metrology.

All previous contributors will be informed concerning the deadline for the next issue. New contributing Radionuclide Metrology laboratories are welcome. Please contact the editor.

Any comments on this issue or suggestions for improvement will be welcome.

At the ICRM General Meeting in Paris 1995, it was decided that the ICRM Newsletter would also allow for the distribution of Progress/Planning Reports SA1 and SA2.

From the experience of this issue, we have the following situation : Laboratories regard their normal Newsletter contribution as the fulfilment of SA1/SA2. In this case this is indicated on the contribution by “SA1/SA2”. Or laboratories provide (additionally) the traditional SA1/SA2 reports which should not be longer than 2 pages. In the latter case it should be mentioned in the accompanying letter, that the SA1/SA2 contributions be intended for publication in the Newsletter.

For economy reasons at the ICRM General Meeting in Dublin 2003, it was agreed that the ICRM Newsletter would be put in the LNE-LNHB (former BNM-LNHB) web site (http://www.nucleide.org/Publications/icrm_newsletter.htm) distributed in hard copy , or CD-rom only to those whom have asked for it.

- Contributions may be sent by E-mail as an attachment in MS Word or as plain text file.

INSTRUCTIONS TO CONTRIBUTORS

This Newsletter is realised with no alterations by the editor. To ensure readability and avoid unnecessary work by the editor, it is suggested that :

- Contributions should be typed on plain white A4 paper (21 cm x 29,7 cm) **format** inside a box of **15,5 cm x 20 cm** which should be situated **4,5 cm** from the upper and **3 cm** from the left margin. Please use font **Times New Roman** size **12**. The format indicated below should be followed.
- Contributions should contain **no** page number, date, signature, or any correspondence references typed on this sheet. Correspondence to the editor must be on a separate sheet.
- Contributions should be in English and carefully proofread by the authors.
- References to publications or reprints should be completed as required by the Physical Review.
- Complete mailing address and the name of a person who can be contacted for additional information by those desiring it should be given at the end.
- Please use the **"contribution.dot**" file included on the pdf version of this issue.

LABORATORY	Name of laboratory
NAMES	If more than one laboratory is involved, identify affiliation through abbreviations (ORNL, LASL, etc.). Visitors can also be identified with asterisks.
APPARATUS ACTIVITY	Choose one; the former for experiments and the latter for compilations, calculations, or theory.
RESULTS	Use this for experimental results.
PUBLICATIONS	Use Physical Review style. Include only published materials.
IN PROGRESS	Use this for description of the current work.
INFORMATION SOURCE	Use this for evaluations or compilations.
IN PREPARATION	Use this to also indicate papers submitted for publication.
OTHER RELATED PUBLICATIONS	Optional.
ADDRESS	Mailing address. Give also telephone, telex, fax numbers and E-mail.
CONTACT	Single contact person.

Obituary : **Dick Helmer**

We were sadly informed in mid-January 2005 of the death of Richard (Dick) Helmer of Idaho National Engineering and Environmental Laboratory and the University of Idaho, USA. While co-ordinating and working on a range of projects that he organised through the βγ Spectroscopy Working Group, Dick was also closely involved in the evaluation studies of the 3NDWG. His scientific endeavours were firmly focused within the fields of gamma-ray spectroscopy, and nuclear data measurements and evaluations, and he achieved high international recognition and respect in these important areas of nuclear physics to the benefit of the nuclear data community.

Dick was a person with a wide spectrum of activities, ranging from cutting-edge research in nuclear spectroscopy to building houses for charitable purposes in underdeveloped countries. We will remember him as a man of high integrity, with an unerring ability to get to the route and solve awkward technical problems, and an underlying willingness to help others at all times.

All ICRM members recognise the significant contribution that Dick made to the field of radionuclide metrology over the years, and the bond of friendship that linked all of us to him. He will be sorely missed by all members of the 3NDWG and ICRM.

President's Message

The International Committee for Radionuclide Metrology (ICRM) is an association of radionuclide metrology laboratories whose membership is composed of delegates of these laboratories together with other scientists (associate members) actively engaged in the study and applications of radioactivity. It explicitly aims at being an international forum for the dissemination of information on techniques, applications and data in the field of radionuclide metrology. This discipline provides a range of tools for tackling a wide variety of problems in numerous other fields, for both basic research and industrial applications.

There are 35 institutions now represented by delegates in the ICRM. The ICRM has no membership fee and no paid secretariat or other staff. Its overall direction is determined by the delegates in General Meetings, which convene usually every two years, where organizational guidelines and directions for the working programs are agreed upon. The following officers of ICRM are presently serving on the Executive Board

Past-President	B.M. Coursey[1]
President	M.J. Woods[2]
Vice-President	M. Korun[3] (elected on 2004)
	Y. Hino[4]
	B.R.Simpson[4]
Secretary	P. de Felice[6]

We all thank H. Janszen for serving the ICRM and wish M. Korun a fruitful and productive period of office.

The Executive Board heavily on the Nominating Committee which has the objective of ensuring the continuity of purpose and vigour of ICRM. It does this by soliciting from the membership, and by itself proposing, the names of eligible candidates to fill vacancies about to occur on the Executive Board and the Nominating Committee. The current membership of this committee is :

Chairperson	N Coursol[7]
Members	M Sahagia[8]
	G Winkler[9]

ICRM activities are largely the responsibility of its working groups. Each group is guided by a co-ordinator who acts as a centre for ideas and communications and may organize conferences and workshops. There are now seven working groups with the following fields of interest:

(1) Alpha-Particle Spectrometry
E. Garcia-Torano[10]

(2) Gamma-Ray and Beta-Particle Spectrometry
J.M. Los Arcos[10]

(3) Liquid Scintillation Techniques
P. Cassette[7]

(4) Low-Level Measurement Techniques
S.M. Jerome[1]

(5) Non-Neutron Nuclear Data
A.L. Nichols[11]

(6) Radionuclide Metrology Techniques
J. Keightley[1], M. Unterweger[5]

(7) Life Sciences
B. Zimmerman[5]

Plenary meetings of the ICRM are held biennially, and have developed into a successful instrument of communication among various specialists, thus encouraging international co-operation. The last biennial conference was held in June 2003 at University College Dublin (UCD) in Dublin.

The next 15th international conference ICRM 2005 will be held at Oxford University, Oxford, England, September 5 – 9 2005 (mailto: icrm2005@npl.co.uk). The ICRM2005 conference will include oral and poster presentations and business meetings of the ICRM Working Groups, in plenary format.

Conference Topics

- Aspects of international metrology
- Intercomparisons
- Measurement standards and reference materials
- Radionuclide metrology techniques
- Alpha-particle and beta-particle spectrometry
- Gamma-ray spectrometry
- Liquid scintillation counting techniques
- Nuclear decay data
- Low level measurements
- Life sciences
- Source preparation

Additional activities during the conference will be the meeting of the ICRM Executive Board, the General Meeting of ICRM members, a visit to the laboratory facilities of the National Physical Laboratory and social events.

Anyone wishing to participate in ICRM's activities or to receive further information is encouraged to contact one of the officers or Working Group chairs.

June 2005 Mike Woods

References

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4. Radioactivity and Neutron Section, Quantum Radiation Division, National Institute of Advanced Industrial Science and Technology (AIST), 1-1-1 Umezono, Tsukuba, Ibaraki, 305-8568 JAPAN
5. Radioactivity Standards Laboratory, National Metrology Laboratory, CSIR-NML, ZA-Rosebank 7700, Cape Town, South Africa
6. ENEA C.R. Casaccia, P.O. Box 2400, I-00100 Rome, Italy
7. CEA, DeTeCS, Laboratoire National Henri Becquerel (LNE-LNHB), F-91190 Gif-sur-Yvette Cedex, France.

8. National Institute of C&D for Physics and Nuclear Engineering (IFIN), P.O. Box MG-6, RO-76900 Bucharest, Romania

9. Institut fur Isotopenforschung und Kernphysik der Universitat Wien Radiuminstitut (IRK), Boltzmanngasse 3, A- 1090 Wien, Austria.

10. Centro de Investigaciones Energeticas, Medioambientales y Technologicas (CIEMAT), Fisica de Radiaciones Ioniz., Avenida Complutense 22, E-28040 Madrid, Spain.

11. Nuclear Data Section, Division of Physical and Chemical Sciences, Department of Nuclear Sciences and Applications, International Atomic Energy Agency (IAEA) Wagramerstrasse 5, A-1400 Vienna, Austria

12. European Commission, Joint Research Centre Institute for Reference Materials and Measurements , (EC-JRC-IRMM), Retieseweg, B-2440 Geel, Belgium

13. University College Dublin, Department of Experimental Physics, Belfield, Stillorgan Road, Dublin 4, Ireland

Report of the Liquid Scintillation Counting Working Group

The Liquid Scintillation Counting Working Group was created in 1997 and its first meeting was held during the ICRM'99 conference in Prague. Further meetings were organized in Saclay in November 2000 and during ICRM symposiums: Braunschweig in 2001 and Dublin in 2003. The aim of this working group is to share information on the use of liquid scintillation counting techniques in the field of radionuclide metrology. This working group focuses on the CIEMAT/NIST and the TDCR methods but also on source preparation and new developments in LSC.

The following topics were discussed during the previous meetings:

- Ionization quenching models and calculation of electron stopping power in the scintillator.
- Atomic and nuclear data needed: beta spectra shape factors, detailed X-ray and Auger K,L and M lines, etc.
- Implementation of the CIEMAT/NIST method: CN2004 package and source preparation.
- Implementation of the TDCR method: detection-efficiency calculation programs.
- Source stability studies: examples of $^{188}W/^{188}Re$ and ^{177}Lu.
- Standardization of various nuclides: ^{18}F, ^{11}C, ^{153}Sm, ^{226}Ra, ^{222}Rn and ^{177}Lu.
- Need to standardize very long-lived radionuclides for the measurement of the half-life: ^{235}U, ^{238}U, ^{40}K, ^{79}Se, ^{87}Rb, ^{147}Sm, ^{176}Lu, ^{187}Rh, ^{190}Pt…

During the last working group meeting in Dublin, it was decided to organize a comparison of the calculated absorbed spectra for the interaction of the 835 keV photons of ^{54}Mn in a liquid scintillator. The aim of this action is to compare the calculation results obtained using various calculation tools, and to provide the metrology community with some information on the choice of these tools. The results of this exercise are the spectrum of the energy absorbed by the scintillator per emission of an 835 keV gamma ray and the probability of interaction of the 835 keV gamma ray within the LS cocktail. This action started in June 2004. This exercise was proposed for a standard 20 ml LS glass vial and for LS cocktail volumes of 10 and 15 ml. The calculation was done for two different cocktails: toluene and a widely used commercial cocktail, Ultima Gold®. Nine laboratories participated in this exercise and a total of 12 calculation codes were used. The results will be presented and discussed during the ICRM2005 conference and the next LSC working group meeting in Oxford.

General information on LSC, TDCR and CIEMAT/NIST methods can be found in the LSC working group web page. Software to calculate detection efficiency can be downloaded and information is given on the composition of usual LSC cocktails The LSC working group web page is hosted by the LNHB server and is accessible, via a hyperlink, from the main ICRM web page or through the LNHB web site at the following address: http://www.nucleide.org/icrm.htm . Participant contributions are welcome and must be sent to the coordinator.

Philippe Cassette, BNM-LNHB
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Tel : 33 1 69 08 48 68
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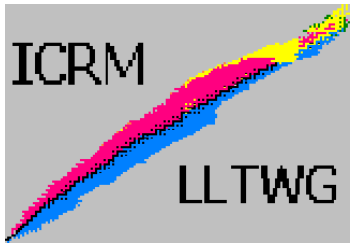
ICRM Low-Level Techniques Working Group Report for 2004



The main activity in the past year has been to manage the publication of papers from the conference held in October 2003. A total of 57 papers were published as a special edition of Applied Radiation and Isotopes (Volume 61, Issues 2-3, Pages 83-421, August–September 2004). Special thanks are due to all the reviewers in reviewing the papers to the publication deadline; I would also like to thank the joint hosts, Martina Schwaiger (ARC-Seibersdorf) and Robert Edelmaier (Bundesamt für Eich- und Vermessungswesen), for the huge task of getting the final versions of the conference papers to the publishers in time for printing.

Other activities this year have been the selection of papers for the main ICRM conference in 2005 and the search for a new co-ordinator, which should be complete at the 2005 conference.

Simon Jerome
NPL-UK
April 2005

2004 Annual Report: Non-Neutron Nuclear Data Working Group (3NDWG)

1. As noted over previous years, the primary aim of the 3NDWG is to provide the worldwide scientific community with an appropriate environment for communications between specialists in the field of non-neutron nuclear data measurements and evaluations so that they can learn more about each others' work, liaise and combine forces to undertake research programmes of mutual interest, and organise multinational efforts to produce recommended sets of non-neutron nuclear data.

2. A significant amount of the work by members of 3NDWG involves the Decay Data Evaluation Project (DDEP), and communications between decay-data evaluators continue to be encouraged through this project (co-ordinator: E. Browne, ebrowne@lbl.gov).

Most recent publications of DDEP data: M.-M. Bé, V. Chisté, C. Dulieu, E. Browne, V. Chechev, N. Kuzmenko, R. Helmer, A. Nichols, E. Schönfeld and R. Dersch, *Table of Radionuclides (Vol. 1 – A = 1 to 150)*, Bureau International des Poids et Mesures, Monographie BIPM-5, ISBN 92-822-2206-3, 2004; *Table of Radionuclides (Vol. 2 – A = 151 to 242)*, Bureau International des Poids et Mesures, Monographie BIPM-5, ISBN 92-822-2207-1, 2004.

3. Noteworthy on-going work by attendees at 3NDWG meetings include the following:
   (a) webpage developments for DDEP (M.-M. Bé), http://www.nucleide.org/DDEP_WG/DDEPdata.htm
   (b) actinide decay-data evaluations through IAEA research contracts (V.P. Chechev),
   (c) internal conversion coefficients of 80.2-keV gamma transition of ^{193}Ir (J.C. Hardy and R.G. Helmer).

4. Other points of note:
   (i) request to re-measure half-lives of ^{235}U and ^{238}U;
   (ii) request to evaluate ^{237}Np decay data;
   (iii) requests for better definition of β-decay shape factors;
   (iv) need to resolve anomalies between recent and on-going half-life measurements (particularly all relevant work of national standards labs: NIST, NPL, PTB, LNHB).

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15 March 2005

Coordinator's Report ICRM Life Sciences Working Group

Working Group meetings

The most recent meeting of the Life Sciences Working Group (LSWG) was held on 4 June, 2003 in Dublin, Ireland as part of the 14th International Conference on Radionuclide Metrology and its Applications. It was preceded by 4 oral and 4 poster presentations presented during the Life Sciences session of the Conference, nearly all of which dealt with the subject of the development of secondary or transfer standards.

Action items arising from the meeting and status:

Evaluation of the ^{90}Y half-life: an evaluation of the ^{90}Y half-life was conducted by D. MacMahon (NPL) in the summer of 2003 and the result transmitted to the LSWG Coordinator for use in the CCRI Key Comparison. A paper containing the results of the evaluation has been submitted to the ICRM2005 meeting in Oxford (September 5-9, 2005).

In addition to the need for an evaluation of the ^{90}Y half-life, the level scheme for ^{103}Pd was also identified as a priority for the medical, as well as the metrological, community. The need for evaluated data that included covariances was expressed, as well as the need for accurate shape factors for β-emitting nuclides. This issue was referred to the NNDWG for consideration.

CCRI Key Comparison of ^{90}Y

The pure beta emitter ^{90}Y has become increasingly important in the field of radionuclide therapy and as a result, is expected to present demands on National Metrology Institutes (NMIs) for accurate measurement standards for this radionuclide. As part of the need by the NMIs to establish equivalence for the measurement of ^{90}Y in support of their calibration and measurement capabilities (CMC) claims, a comparison between the laboratories and the Bureau International des Poids et Mesures (BIPM) was proposed.

The comparison was organized by the International Atomic Energy Agency (IAEA) as a follow-up to a pilot comparison conducted by the Life Sciences Working Group of the International Committee on Radionuclide Metrology in late 2002. The full key comparison was carried out during the last quarter of 2003 according to a protocol that was agreed to by all of the participants in July 2003. A total of 7 NMIs and the BIPM took part in the exercise.

A single master solution containing nominally 80 MBq·g^{-1} of ^{90}Y (as of the shipping date, 22 October 2003) in 1 mol·L^{-1} HCl and approximately 50 μg of YCl_3 per gram of solution was prepared by the National Institute of Standards and Technology (NIST) and divided into 5 mL aliquots that were subsequently distributed to each participant in the form of a flame-sealed NIST-style ampoule. As each laboratory performed measurements on aliquots of the same solution, the results could be easily compared.

The arithmetic mean of the reported values from the participants was 8664 kBq·g^{-1}; u = 4 kBq·g^{-1}, where the uncertainty is the standard deviation of the mean of the final results from the 8 laboratories. This mean activity value was adopted by the CCRI(II) as the Key Comparison Reference Value, x_R.

The analysis of possible radionuclidic impurities was not performed uniformly. Several laboratories analysed only for gamma-emitting radionuclides, despite the fact that the most common impurity associated with ^{90}Y is the pure beta-emitter ^{90}Sr. The data show that the impurity ratios are spread over a range having a factor of 100 between the smallest and largest values. There are insufficient data to draw definite conclusions but there is at least a suggestion that the determination of the ^{90}Sr/^{90}Y ratio is somewhat method-dependent. This warrants further investigation. The NPL has offered to propose a comparison exercise to demonstrate the state of laboratories' abilities to measure the impurity ratio. The LSWG has

not received an update on the status of comparison, but it will be addressed at the next Working Group meeting in Oxford.

IAEA Cooperative Research Project on harmonization of nuclear medicine radioactivity measurement practices

An important component of the development of guidance for establishing QA/QC programmes in nuclear medicine radioactivity metrology is the need to learn how such programmes are actually implemented in practice. A Cooperative Research Project (CRP) entitled "Harmonization of Quality Assurance Practices for Nuclear Medicine Radioactivity Measurements (E2.10.05)" was initiated in December 2004 and is expected to run for 4 years exactly for this purpose. The main goals of the CRP are to:

- Gather information about the current status of QA/QC programmes and metrology in nuclear medicine metrology and how they were developed in order to develop a strategy for introducing these concepts into Member States;
- Obtain baseline radioactivity measurement performance data for secondary standards radioactivity laboratories and clinical sites and perform comparison exercises to determine the degree of effectiveness of quality programme implementation; and
- Perform radioactivity measurement comparisons to enable laboratories not already having traceability to international standards for certain radionuclides to establish it.

The participating institutions are:

1. Instituto de Radioproteção e Dosimetria (IRD), Brazil
2. Centro de Isótopos (CENTIS), Cuba
3. Czech Metrology Institute (CMI)
4. Bhaba Atomic Research Centre (BARC), India
5. Nuclear Research Center for Agriculture and Medicine (NRCAM), Iran
6. National Institute of R&D for Physics and Nuclear Engineering "Horia Hulubei" (IFIN-HH), Romania
7. Korea Food and Drug Administration (KFDA)
8. Ankara University Faculty of Medicine, Turkey

The first Research Coordination Meeting will be held in June 2005 to finalize the work plan. An update on the status of the project will be presented at the LSWG meeting in Oxford.

B. E. Zimmerman, Coordinator

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ICRM

CONTRIBUTIONS

LABORATORY : METROLOGIA DE RADIOISOTOPOS (SA1/SA2)
CNEA, ARGENTINA

NAMES : P. ARENILLAS, C. BALPARDO, M. E. CAPOULAT, D. RODRIGUES

APPARATUS: 4πβ (PPC)-γ (NaI) coincidence system.
4π proportional counter.
Si-PIP and surface barrier detectors.
LSC TDCR System.

ACTIVITY: 1. Absolute activity measurements.
2. Participation in international comparisons.

RESULTS : 1. Implementation of a LSC TDCR System.
2. Peer review of coincidence methods.

IN PROGRESS: 1. Improvement of a new definite solid angle alpha system.
2. Improvement of a LSC TDCR system.
3. Improvement of a HPPC-NaI(Tl) coincidence system.
4. Absolute activity measurements.
5. Participation in the SIR for the activity measurements for Cs-134 and Eu-152.
6. Implementation of a 4π gamma system.
.

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LABORATORY: METROLOGIA DE RADIOISOTOPOS (SA1/SA2)
CNEA, ARGENTINA.

NAMES: G.L CERUTTI, X.L. ARAYA, E.CIRELLO, L. RAMÍREZ

APPARATUS: Liquid scintillation counting system.

ACTIVITY: 1.Measurement of natural and artificial radionuclides in environmental samples.

RESULTS: 1. Activity determinations of ^{90}Sr in 173 samples of milk powder, maize, soyabean meal, wheat and cheese .
2. Activity determinations of gross alpha and gross beta in 34 water samples.
3. Activity determinations of ^{241}Am and ^{239}Pu in 173 milk powder, maize, soyabean meal, wheat and cheese samples.

IN PROGRESS: Implementation of a quality system based on Guide ISO 17025.

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CNEA, ARGENTINA.

NAMES: G.L. CERUTTI, F.A. IGLICKI, G.R. BOCCA, X.L. ARAYA, E.CIRELLO, L. RAMÍREZ

APPARATUS:
High pressure ionisation chambers.
HPGe spectrometer systems.
HPGe planar detector.
NaI(Tl) scintillation detector.
Automatic sample changers.
Multichannel analysers and personal computers.

ACTIVITY:
1. Preparation, quality control, standardisation and issue of :
   - Standard point sources and solutions of several radionuclides for gamma-ray and alpha spectrometry.
   - Large area standard sources of alpha, beta and gamma emitters.
2. Routine measurements and certifications of non radioactive contamination in exported foodstuffs.
3. Development of standard sources.

RESULTS:
1. Certifications of non radioactive contamination, by gamma emitters in 3529 samples of imported and exported foodstuffs.
2. Preparation and calibration of 58 radioactive sources.
3. Determination of Co-60 activity in 771 samples for surface contamination and sealed control of sources used in cobalt therapy.
4. Accreditation of “Preparation and calibration of radioactive standards” by Argentinean Accreditation Organism following GUIDE ISO 17025.

IN PROGRESS:
1. Development of simulated water standards.
2. Characterisation of a metrological ionisation chamber

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LABORATORY: METROLOGIA DE RADIOISOTOPOS (SA1/SA2)
CNEA, ARGENTINA.

NAMES: M.I. MILA, M. CAPOULAT.

APPARATUS: Ionisation chamber dose calibrators.
GeHp and NaI(Tl) gamma-ray spectrometer systems.

ACTIVITY:
1. Routine metrological assessment of radionuclide calibrators used in Nuclear Medicine.
2. Preparation, quality control and standardisation of standard sources for Nuclear Medicine.
3. Organisation of intercomparison for activity measurements among Nuclear Medicine Centres in Argentina.

RESULTS:
1. Assessment of 1 Nuclear Medicine Centre calibrator for ^{99m}Tc, ^{131}I and ^{201}Tl.
2. Assessment of 43 commercial calibrators for ^{18}F, ^{67}Ga, ^{99m}Tc, ^{131}I and ^{201}Tl.
3. Accreditation of "Activimeters calibration" by Argentinean Accreditation Organism following GUIDE ISO 17025.

IN PROGRESS : Organisation of intercomparison for activity measurements of ^{131}I, among Argentinian Nuclear Medicine Centres.

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CONTACT: M. I. MILA

LABORATORY	Radiation Metrology, Australian Nuclear Science & Technology Organisation (ANSTO)
NAMES	D Alexiev, L Mo, M Reinhard, J Davies
APPARATUS ACTIVITY	1. $4\pi\beta$(PC)–γ coincidence counting system. 2. High purity germanium detectors. 3. Pressurised TPA and Vinten ionisation chambers.
RESULTS	1. Conversion of the activity standard for Y-90 solution to microspheres through chemical digestion of Y-90. 2. Standardisation of ^{153}Sm solution using $4\pi\beta$(PC)–γ coincidence counting technique. 3. Development of secondary dosimetry standard for air kerma measurement of I-125 brachytherapy seeds (Model 6711) with traceability to NIST primary standard. 4. Participated in an IAEA coordinated TLD dose audit with accuracy to within 1% demonstrated.
PUBLICATIONS	L. Mo, B. Avci, D. James, B. Simpson, W.M.Van Wyngaardt, J.T. Cessna and C. Baldock, Development of activity standard for ^{90}Y microspheres, Appl. Rad. Isot. 2005, in press. D Alexiev, N Dytlewski, M I Reinhard, L Mo, Characterisation of single-crystal mercuric iodide, Nucl. Instr. Meth. A517, pp. 226-229 (2004).
IN PROGRESS	1. Construction of TDCR liquid scintillation systems. 2. Development of Au-198 foil activity standard for the flux measurement of ANSTO Replacement Research Reactor (RRR).
ADDRESS	New Illawarra Road Lucas Heights NSW 2234 Australia Tel: 61-2-97173182; Fax: 61-2-97179265 E-mail: dax@ansto.gov.au
CONTACT	Dr D Alexiev

LABORATORY	BEV – Bundesamt für Eich- und Vermessungswesen
NAMES	F:J. Maringer, P. Jachs, M. Kreuziger, P. Michai
APPARATUS	Radioactivity laboratory with low-level facilities HPGe detectors for gamma spectroscopy Calibrated $4\pi\,\gamma$ ionisation chambers Low-level anti-compton HPGe gamma spectrometer Multiwire proportional chamber radon chamber with traceable radon ionisation chambers
ACTIVITY	Routine certification (medical activity meter, surface contamination monitors) Participation in international comparison (EUROMET, CCRI) and bilateral comparisons Calibration services
RESULTS	CCRI(II)-K.2.Am-241 CCRI(II)-K2.Ir-192 CCRI(II)-K2.Mn-54 CCRI(II)-K2.Zn-65
IN PROGRESS	CCRI(II)-K2.I-125 EUROMET.RI(II)-S1.Rn-222 / EUROMET Proj. 657 - Comparison of radon monitors National comparison in gamma spectrometry / activity concentration in aqueous solution National comparison radon activity concentration in air measurements Development of a primary standard for surface emission rate (large area sources) Monte Carlo calculations of ISOCAL IV ionisation chamber response to gamma and beta emitters
OTHER RELATED PUBLICATIONS	Hrachowitz, M., Maringer, F.J., Gerzabek, M.H. Soil Redistribution Model for Undisturbed and Cultivated Sites Based on Chernobyl ^{137}Cs Fallout. Journal of Environmental Quality. (accepted)
ADDRESS	BEV – Bundesamt für Eich- und Vermessungswesen Sect. Ionising Radiation and Radioactivity Arltgasse 35 1160 Wien AUSTRIA
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LABORATORIES	IAEA Nuclear Data Section, Vienna, Austria; Serco Assurance, Winfrith Science Centre, Dorchester, UK
NAMES	A L Nichols (IAEA) and R J Perry (Serco Assurance)
ACTIVITY	Decay-data evaluations and preparation of databases
RESULTS/ INFORMATION	Decay-data evaluations underway in 2005-06: (a) evaluations for DDEP: ^{97m}Tc, ^{109}Pd, ^{126}Sb, ^{127}Sb, ^{127}Te and ^{127m}Te; (b) ^{192}Au, and ^{214}Bi (latter within ^{226}Ra decay chain); (c) additional evaluations for JEFF-3 fusion.
PUBLICATIONS	O Bersillon et al, "JEFF-3T: Decay Data and Fission Yield Libraries", ND2001 Int. Conf. Nucl. Data for Science and Technology, 7-12 Oct 2001, Tsukuba, Japan; also J. Nucl. Sci. Technol., Supplement 2, Vol 1 (2002) pp 478-480.
IN PROGRESS	Evaluation of decay data for DDEP.
INFORMATION	Evaluations completed in 2004, and databases assembled in early 2005 for JEFF-3 library: ^{80}Ge, ^{97}Y, ^{97m}Y, ^{97g}Y, ^{111}Rh, ^{113}Pd, ^{113m}Pd, ^{129}Sn, ^{129m}Sn, ^{130}Sn, ^{130m}Sn, ^{123}Cs, ^{123m}Cs, ^{149}Ce, ^{155}Pm, ^{163}Gd, ^{146}Tb, ^{146m}Tb, and ^{167m}Er; also most of ^{226}Ra decay chain (except ^{214}Bi). Evaluations planned in future years for DDEP: ^{106}Rh, ^{132}Te, ^{132}I, ^{144}Pr and ^{201}Pb. Also additional evaluations for JEFF-3.
IN PREPARATION	^{234m}Pa decay data evaluation.
OTHER RELATED PUBLICATIONS	A L Nichols, Decay Data: Review of Measurements, Evaluations and Compilations, Appl. Radiat. Isot., 55 (2001) 23-70. M Herman and A L Nichols, Update of X- and Gamma-ray Decay Data Standards for Detector Calibration and Other Applications, INDC(NDS)-437, December 2002. A L Nichols, IAEA Co-ordinated Research Project: Update of X-ray and Gamma-ray Decay Data Standards for Detector Calibration and Other Applications, Appl. Radiat. Isot., 60 (2004) 247-256.
ADDRESS	IAEA Nuclear Data Section, Department of Nuclear Sciences and Applications, PO Box 100, Wagramerstrasse 5, A-1400 Vienna, Austria.
CONTACT	Dr Alan Nichols

Summary of the research programme related to radionuclide metrology for the years 2004 and 2005

at the "Institut für Isotopenforschung und Kernphysik" (IIK)
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http://www.univie.ac.at/Kernphysik/irk_engl.htm

[also to be regarded as contribution according to the ICRM standing actions SA1 and SA2]

Presently, the activities at the IIK concentrate on the improvement and development of atomic and nuclear measuring techniques and data handling procedures for interdisciplinary applied physics work with special emphasis on the detection of long-lived radionuclides, particularly in the very-low-level range. Nuclear-decay-counting techniques have been widely replaced by mass-spectrometric techniques with high selectivity and high sensitivity. More detailed information about research at the IIK is also be provided via the institute's internet home page given above.

Due to a reorganization of the university structure and funding policies, that part of the institute which dealt with conventional radionuclide metrology had to leave the historical building of the old "Vienna Radium Institute" and move into a building close to the VERA facility (see below) with the new address given above. Preparations for the move started already in 2004, the transfer of the heavily shielded equipment and of radioactive sources (including a ^{241}Am-Be neutron source) still has to be postponed until working rooms have been adapted.

Names: M. Auer, O. Forstner , H. Friedmann, E. Friedl, R. Golser, J. Gröller, P. Hille, M. Kafesie, P. Kröpfl, J. Kühtreiber, W. Kutschera (director), J. Lukas, E. Pak, A. Pavlik, A. Priller, J. Riede, P. Steier, B. Strohmaier, S. Tagesen, H. Vonach, A. Wallner, F. Weninger, E. Wild, G. Winkler

1. The tandem-accelerator mass-spectrometry facility VERA (Vienna Environmental Research Accelerator) and its use

The VERA facility is based on a 3-MV Pelletron tandem accelerator (from National Electrostatics Corporation in Wisconsin, USA). For details on the experimental equipment see http://www.univie.ac.at/Kernphysik/VERA/welcome.htm .
Accelerator mass spectrometry (AMS) is a major field of research at the IIK. With AMS the radionuclides are measured by direct atom counting; selectivity is achieved employing energy-, momentum- and velocity-selecting devices (electrostatic, magnetic and time-of-flight/Wien filters) and using ion detectors for counting and final energy measurement. The interesting nuclides (with extremely small radioisotope-to-stable-isotope ratios in the 10^{-10} to 10^{-15} range) cannot be measured at natural levels through radioactive-decay counting, particularly for small samples in the milligram range, typically containing only 10^5 to 10^8 radionuclide atoms. Predominantly isotope ratios are measured relative to appropriate standards.

Typically, in the light-ion region atoms like ^{14}C (5.7×10^3 a, for radiocarbon dating), ^{10}Be ($T_{1/2}=1.5\times10^6$ a) and ^{26}Al ($T_{1/2}=7.2\times10^5$ a) (both for applications in geology) are counted with an excellent suppression of isobaric background. Through the recent upgrades of VERA it has been possible to measure also ions from very heavy long-lived radionuclides such as ^{129}I ($T_{1/2} \approx 1.6\times10^7$ a) [$^{129}I/^{127}I$ ratios], ^{210}Pb ($T_{1/2} \approx 22$ a), ^{236}U ($T_{1/2} \approx 23\times10^6$ a) [marker for contamination by irradiated uranium, also daughter product of the decay of ^{240}Pu], ^{244}Pu ($T_{1/2} \approx 81\times10^6$ a) [for research on e.g. interstellar medium grains], ^{242}Pu ($T_{1/2} \approx 3.8\times10^5$ a) and ^{182}Hf ($T_{1/2} \approx (9\pm2)\times10^6$ a) in natural samples.

2. Conventional radionuclide instrumentation and evaluation

a) Work using equipment as mentioned under item 3 of the last year's report has been hampered by the necessary move of all the devoted equipment to the new site of the institute (see above).
b) The conventional *^{14}C laboratory* was shut down, since a transfer to the new site was not possible.

3. Other projects

a) *Program to evaluate and check the reliability of the half-life values of some long-lived radionuclides ("How well do we know our clocks"*) relevant to archaeochronology, geochronology and cosmochronology [compare, e.g., F. Begemann et al., Call for an improved set of decay constants for geochronological use, Geochim. Cosmochim. Acta 65 (2001) 111-121].
In addition, the basic question of the change of half-lives due to stellar environments or other extreme environmental conditions are to be discussed.
Based on new attempts to extend the calibration for radiocarbon dating to periods more than 10 000 years ago, from the trend of the found calibration curve it may be suspected that the adopted value of the half-life of ^{14}C may has to be revised, or there may exist other reasons not yet known to explain the observed trend. Anyway, studies are undertaken to find a method for a direct accurate re-measurement of the half-life of ^{14}C.

b) *A critical review of experimental data for the half-lives of the uranium isotopes ^{238}U and ^{235}U* was published:
R. Schön, G. Winkler, W. Kutschera: Applied Radiation and Isotopes 60 (2004) 263 –273 (Proceedings of the 14th International Conference on Radionuclide Metrology and its Applications, ICRM 2003, in Dublin)

c) *Austrian National Radon Project (ÖNRAP)* [H. Friedmann]:
This project (see the previous years' reports) to determine the radon exposure of the population in Austria as well as to classify areas according to their potential radon risk from the ground ("radon potential"), is essentially completed

(http://www.univie.ac.at/Kernphysik/oenrap/onrap_e.htm).
A "Radon information CD" (H. Friedmann) is also available.
Correlations between the so-called radon potential and details of the geology are to be investigated.

4. Work and co-operation on special reports and standard concepts, training tasks

Co-operation with the *Austrian Standards Institute* (OENORM) [H. Friedmann, G. Winkler] to achieve a uniform interpretation of low-level measurements and to harmonise measurement-uncertainty statements is continued. Participation and lecturing in the *VERMI (Virtual European Radionuclide Metrology Institute) Young Researchers Workshop* (mainly on absolute counting methods) [1 – 5 Dec. 2003 at the CEA Headquarters, Paris, hosted by BNM-LNHB]; contributions by G. Winkler on "High-efficiency photon detection systems for accurate radioactivity measurements" and "The 4π-γ NaI(Tl) detector of the IIK, University of Vienna" on a VERMI CD issued in February 2004. Students' training in the field of general experimental physics, quantum physics, atomic physics, nuclear physics, ion physics and radioactivity measurements is taken care of by the staff of the IIK.

5. Participation in international organisations

- International Committee for Radionuclide Metrology (ICRM) [G. Winkler];
- Consultative Committee for Ionising Radiation (CCRI), Section II (Measurement of Radionuclides) at the BIPM, Sèvres, France [member: G. Winkler];

April 2005 Gerhard Winkler

LABORATORY	European Commission - Joint Research Centre Institute for Reference Materials and Measurements (IRMM) JRC Reference Laboratory for Radionuclide Metrology
NAMES	S. Pommé, G. Sibbens, T. Altzitzoglou, R. Van Ammel, J. Keightley
APPARATUS ACTIVITY	radioactive source preparation (quantitative drop deposition, vacuum evaporation and electrodeposition)
	4π pressurised gas proportional counter windowless 4πCsI(Tl)-sandwich spectrometer two α-particle counters at defined solid angle atmospheric $4\pi\beta$–γ coincidence counter pressurised $4\pi\beta$–γ coincidence counter $4\pi\gamma$ NaI well counter two secondary standard ionisation chambers two 4p liquid scintillation counters
RESULTS	Standardisation of ^{65}Zn, ^{192}Ir, ^{241}Am, ^{54}Mn and ^{125}I for CCRI key comparisons.
	Standardisation of ^{60}Co, ^{134}Cs and ^{137}Cs.
	Standardisation of ^{241}Am and ^{239}Pu reference sources for the traceability chain of the reference material IAEA-375.
PUBLICATIONS	R. Van Ammel, S. Pommé, G. Sibbens, Experimental verification of the half-life of ^{65}Zn, Appl. Radiat. Isot. 60 (2004) 337-339.
	G. Sibbens, S. Pommé, T. Altzitzoglou, Standardisation of low-activity actinide solutions by alpha-particle counting at a defined solid angle, Appl. Radiat. Isot. 61 (2004) 405-408.
	S. Pommé, A complete series expansion of Ruby's solid-angle formula, Nucl. Instr. and Meth. A 531 (2004) 616-620.
IN PROGRESS	Half-life determination of ^{55}Fe.
	Standardisation of ^{32}P.
	Intercomparison of DCC analysis algorithms with external partners.
	Determination of the half-life of ^{233}U, ^{235}U and ^{238}U.
SOURCE IN PREPARATION	S. Pommé, T. Altzitzoglou, R.Van Ammel, G. Sibbens, Standardisation of ^{125}I using seven techniques for radioactivity

measurement, in press in Nucl. Instr. and Meth. in Phys. Research A.

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CONTACT

Stefaan Pommé.

LABORATORY	European Commission - Joint Research Centre Institute for Reference Materials and Measurements (IRMM) JRC Reference Laboratory for Radionuclide Metrology
NAMES	G. Sibbens, S. Pommé
APPARATUS ACTIVITY	radioactive source preparation by vacuum evaporation two high resolution semiconductor alpha-particle spectrometers
RESULTS	A new set of alpha-particle emission probabilities and energies in the decay of ^{235}U (EUROMET 591). A new spreadsheet application ALPHA for deconvolution of alpha-particle spectra.
PUBLICATIONS	S. Pommé, G. Sibbens, Concept for an off-line gain stabilisation method, Appl. Radiat. Isot. 60 (2004) 151-154. G. Sibbens, S. Pommé, Study of alpha-particle emission probabilities and energies in the decay of ^{240}Pu, Appl. Radiat. Isot. 60 (2004) 155-158. S. Pommé, G. Sibbens, A new off-line gain stabilisation method applied to alpha-particle spectrometry, Advanced Mathematical and Computational Tools in Metrology VI, ed. P. Ciarlini, M.G. Cox, F. Pavese, G.B. Rossi (World Scientific Publishing Company, 2004) pp. 327-329.
IN PROGRESS	EUROMET project no 749 on alpha-particle emission probabilities and energies in the decay of ^{240}Pu.
SOURCE IN PREPARATION	E. García-Toraño, M.T. Crespo, M. Roteta, G. Sibbens, S. Pommé, A.M. Sánchez, M.P.R. Montero, S. Woods, A. Pearce, Alpha-particle emission probabilities and energies in the decay of ^{235}U, submitted to Nucl. Instr. and Meth.
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LABORATORY	European Commission - Joint Research Centre Institute for Reference Materials and Measurements (IRMM) JRC Reference Laboratory for Radionuclide Metrology
NAMES	T. Altzitzoglou
APPARATUS	1. HPGe detector systems (incl. low background detectors) 2. Low and Ultra low level liquid scintillation spectrometers 3. Facilities for radiochemical separations 4. Various instruments for thin foil production and radioactive source preparation.
RESULTS	1. Standardisation of ^{32}P, ^{192}Ir, ^{65}Zn, ^{241}Am, ^{54}Mn, ^{125}I (BIPM/CCRI(II) international comparisons). 2. Determination of photon emission probabilities of ^{65}Zn (EUROMET project 721).
PUBLICATIONS	1. T. Altzitzoglou “Analysis of triple-label samples by Liquid Scintillation Spectrometry”, Appl. Radiat. Isot. **60** (2004) 487-491. 2. T. Altzitzoglou, G. Sibbens, M. Bickel, A. Bohnstedt, J.-G. Decaillon, C. Hill and L. Holmes “Characterisation of reference materials for radioactivity with assigned values traceable to the SI units”, Appl. Radiat. Isot. **61** (2004) 395-399. 3. C. Hill, M. Bickel, L. Holmes, A. Bohnstedt, G. Sibbens, T. Altzitzoglou “Aspects of Sample preparation for the Determination of Actinoids in Soil”, Appl. Radiat. Isot. **61** (2004) 283-286. 4. G. Sibbens, S. Pommé, T. Altzitzoglou “Standardisation of low-activity actinide solutions by alpha-particle counting at a defined solid angle”, Appl. Radiat. Isot. **61** (2004) 405-408. 5. J.-G. Decaillon*, M. Bickel, C. Hill, L. Holmes, T. Altzitzoglou “Validation of methods for the determination of radium in waters and soil”, Appl. Radiat. Isot. **61** (2004) 409-413. 6. A. Stolarz, M. Benedik, M.A. Alonso, T. Altzitzoglou, W. De Bolle, H. Kuhn, A. Moens, E. Ponzevera, C. Quetel, A.L. Verbruggen, R. Wellum “NUSIMEP: An external QC programme for measuring nuclear isotopes in environmental studies”. In: Proc. of the Int. Conf. on Isotopes in Environmental Studies - Aquatic Forum 2004, IAEA, 25-29 October 2004, Monte Carlo (MNC).

IN PROGRESS	1. Characterisation of the IAEA-152 (Milk powder) and IAEA-375 (Soil) RMs using radiochemical methods. 2. Comparison of calculated spectra for the interaction of 835 keV photons in a liquid scintillator.
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CONTACT	Timos Altzitzoglou

LABORATORY	European Commission - Joint Research Centre Institute for Reference Materials and Measurements (IRMM) JRC Reference Laboratory for Radionuclide Metrology
NAMES	Mikael Hult, Gerd Marissens, Joël Gasparro, Werner Preusse*
APPARATUS ACTIVITY	Seven underground HPGe-detectors for ultra low level gamma-ray spectrometry.
RESULTS	* Activation products flux monitors activated by the thermonuclear plasma at JET * Radionuclides as a means to check authenticity of organic farming * ^{210}Pb distribution in human bones * Radiation protection – dosimetry using neutron activation by fast neutrons * Radiopurity measurements for detector development
PUBLICATIONS	Hult M, Gasparro J, Shizuma, K, Vasselli R, Neumaier S and Arnold D, "Deep underground measurements of ^{60}Co in steel exposed to the atomic bomb in Hiroshima", Appl. Radiat. Isot. **61** (2004) 173-177. Gasparro J, Hult M, Komura K, Vasselli R, Johnston PN, Laubenstein M, Neumaier S, Arnold D, Reyss JL, Schillebeeckx P, Tagziria H, Holmes L and Van Britsom G, "Measurement of ^{60}Co in Spoons Activated by Neutrons During the JCO Criticality Accident at Tokai-mura in 1999", J. Environm. Radioactivity **73** (2004) 307-321. Laubenstein M, Hult M, Gasparro J, Heusser G, Köhler M, Neumaier S, Arnold D, Povinec P, Reyss JL, Schwaiger M and Theodorsson P, "Underground Measurement of Radioactivity", Appl. Radiat. Isot. **61** (2004)167-172. Köhler M, Hult M, Gasparro J, Neumaier S, Arnold D, "Reference Measurements and Benchmarking of Radioactivity in German Steel", Appl. Radiat. Isot. **61** (2004)207-211. Kockerols P, Hult M, Gasparro J, Lövestam G, Lebaque A-L, VanHavere F, Janssens H, "Neutron Field Measurements for ALARA purposes around a Van de Graaff accelerator building", Radiation Protection Dosimetry **110** (2004) 711-715. Johnston PN, Hult M, Gasparro J, Vasselli R, Martinez-Canet M-J,

Mc Kenzie RJ, Solomon SB and Lambrichts I, "The distribution of ^{210}Pb in Human Bone and its impact on Methods for the Retrospective Estimation of ^{222}Rn Exposure from *in vivo* Measurements", J. Environm. Radioactivity **80** (2005) 245-257.

IN PROGRESS

* Measurements of ^{60}Co in steel from Hiroshima

* Neutron dosimetry and plasma characterisation using activation of metal discs

* Neutron cross section measurements by activation and deconvolution.

* Intercomparison work

* Ultra low background detector developments

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Mikael Hult

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LABORATORY	Laboratório Nacional de Metrologia das Radiações Ionizantes LNMRI/IRD/CNEN
NAMES	A. Iwahara, C.J. da Silva, E.M.O. Bernardes, P.A.L. da Cruz, J. dos S. Loureiro, R. Poledna, M.A.R.R. di Prinzio
ACTIVITY	4πβ(PPC)-γ(Ge) and 4πβ(PC)-γ(NaI(Tl)) coincidence systems, 4πγ ionization chambers, WALLAC liquid scintillation counter.
RESULTS	1- Standardization of ^{125}I, ^{109}Cd, ^{201}Tl and ^{203}Hg solutions. 2- Quality assurance program with hospitals.
PUBLICATIONS	Joyra A. dos Santos, A. Iwahara, Antônio E. de Oliveira, Mônica A. L. da Silva,Carlos J. da Silva, Luiz Tauhata and Ricardo T. Lopes, *National intercomparison program for radiopharmaceutical activity measurements*. Appl. Radiat. Isot., 60 / 2,4 (2004) 523-527. A. Iwahara, M. A. L. da Silva, A. E. C. Filho, E. M. De O. Bernardes, J. U. Delgado, *Determination of Disintegration Rates and g-ray emission probabilities of ^{65}Zn and ^{241}Am,* Appl. Radiat. Isot., (2005) in press.
IN PROGRESS	Standardization of ^{32}P and ^{67}Ga Implementation of TDCR and MTR2 modules for absolute standardization ongoing.
SOURCE IN PREPARATION	Activity characterization of ^{192}Ir brachytherapy wire sources. Standardization and decay data determinations of ^{54}Mn, ^{203}Hg and ^{125}I Implementation of a national metrology net of radionuclides used in nuclear medicine
ADDRESS	Instituto de Radioproteção e Dosimetria, Av. Salvador Allende, s/n, Recreio, CEP 22780-160, Rio de Janeiro, Brazil.Tel: ++55 21 3411 8179 Fax: ++55 21 2442 1605 E-maiL: iwahara@ird.gov.br
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LABORATORY	Laboratório Nacional de Metrologia das Radiações Ionizantes LNMRI/IRD/CNEN
NAMES	Antonio E. De Oliveira , C.J.Da Silva, E.M.O. Bernardes, J.U. Delgado, M.A.R.R. di Prinzio, R. Poledna.
ACTIVITY	HPGe – 50%, NaI(Tl) Iodide 3x3
RESULTS	1 - Half-life determination. 2 - Impurity study by gamma-ray spectrometry. 3- Determination of photon emission probabilities
PUBLICATIONS	J. Morel, S. Sepman, M. Rasko, E. Terechtchenko and José U. Delgado. *Precise determiantion of photon emission probabilities for the main X- and g-rays of ^{226}Ra in equiliobrium with daughters*. Appl. Radiat. Isot., 60 / 2,4 (2004) 341-346. Karla C. Souza, Mônica A. L. Da Silva, José Ubiratan Delgado, Roberto Poledna, Ricardo T. Lopes and C. J. Da Silva. *Measurements of nuclear data parameters of ^{201}Tl by gamma-ray spectrometry*. Appl. Radiat. Isot., 60 / 2,4 (2004) 307-310. Mônica A. L. Da Silva, Maria C. M. De Almeida, Carlos J. Da Silva and José Ubiratan Delgado. *Use of the reference source method to determine the half-lives of radionuclides of importance in nuclear medicine*. Appl. Radiat. Isot., 60 / 2,4 (2004) 301-305. Mônica A. L. Da Silva, Maria C. M. De Almeida, and José Ubiratan Delgado. *Measurements of half-lives of radionuclides by reference method.. J. Radioanl. Nucl. Chem.* (2005) in press.
IN PROGRESS	Measurements of nuclear data parameters in the standardization of ^{203}Hg, ^{67}Ga and ^{201}Tl.
ADDRESS	Instituto de Radioproteção e Dosimetria, Av. Salvador Allende, s/n, Recreio, CEP 22780-160, Rio de Janeiro, Brazil.Tel: ++55 21 3411 8173 Fax: ++55 21 2442 1605 EmaiL :delgado@ird.gov.br
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LABORATORY	Laboratório Nacional de Metrologia das Radiações Ionizantes LNMRI/IRD/CNEN
NAMES	A.C.M. Ferreira, A.E. de Oliveira , A. F. Clain, L. Tauhata, M.E.C. Vianna, M. J. C. S. de Bragança and A.M.G.F.Azeredo.
ACTIVITY	1. Spike sources of beta, alpha and multi-gamma emitters in water matrix. 2. Samples of sediment and soils taken from Poços de Caldas region in Brazil.
RESULTS	1- Quality control program of environmental laboratories
PUBLICATIONS	M. J.C. S. Bragança, L. Tauhata, A. F. Clain, I. Moreira, *The use of instrumental neutron activation and multivariate statistic analysis in differentiation of Brazilian phosphate ores,* Appl. Radiat. Isot . 61 (2004) 351-355
IN PROGRESS	Study of homogenity of soil samples from Poços de Caldas region.
ADDRESS	Instituto de Radioproteção e Dosimetria, Av. Salvador Allende, s/n, Recreio, CEP 22780-160, Rio de Janeiro, Brazil.Tel: ++55 21 3411 8154 Fax: ++55 21 2442 1605 E-mail : tauhata@ird.gov.br
CONTACT	L. Tauhata

LABORATORY	Laboratoire National Henri Becquerel
NAMES	M.M. Bé, V. Chisté, C. Dulieu
ACTIVITY	Evaluation of Radionuclide Decay Data
RESULTS	Publication of new volumes of the Table of Radionuclides
PUBLICATIONS	Table of Radionuclides, Monographie BIPM-5, ISBN 92-822-2207-7 (set) and ISBN 92-822-2205-5 (CD), CEA/BNM-LNHB, 91191 Gif-sur-Yvette, France and BIPM, Pavillon de Breteuil, 92312 Sèvres, France. NUCLÉIDE, Table de Radionucléide sur CD-Rom, Version 2-2004, CEA/BNM-LNHB, 91191 Gif-sur-Yvette, France.
IN PROGRESS	- Evaluation of Ag-108, Ag-108m, Sr-90, Y-90 - Articles in preparation : • Detailed calculation of Auger electron emission intensities following the radioactive disintegration • Activity measurements and gamma emission intensities determination in the decay of ^{65}Zn
INFORMATION	Use this for evaluations or compilations.
SOURCE IN PREPARATION	Lu-176
OTHER RELATED PUBLICATIONS	http://www.nucleide.org/Nucdata.htm
ADDRESS	DRT/DeTeCS/LNHB CEA-Saclay F-91191 Gif-sur-Yvette cedex, FRANCE Tel : +33 1 69 08 46 41 Fax : +33 1 69 08 26 19 E-mail : mmbe@cea.fr
CONTACT	Marie-Martine Bé

LABORATORY	LNE – Laboratoire National Henri Becquerel
NAMES	E. Leblanc, M. Loidl, M. Rodrigues
APPARATUS	Cryogenic detectors
RESULTS	Feasibility study of alpha spectrometry with a resistive bolometer : energy resolution FWHM = 5.5 keV for 5.5 MeV alpha particles
	Development of a magnetic bolometer for electron capture decay nuclides atomic data determination : detection efficiency greater than 99 % for electrons and photons between 50 eV and 6.5 keV.
IN PROGRESS	Feasibility study of gamma spectrometry with magnetic bolometers for actinides isotopic determination
	Feasibility study of electron spectrometry with magnetic bolometers
	Integration of cold 2 stage SQUID detector read-out in a new dilution refrigerator (base temperature = 10 mK)
PUBLICATIONS	M. Loidl, E. Leblanc, J. Bouchard, T. Branger, N. Coron, J. Leblanc, P. de Marcillac, H. Rotzinger, T. Daniyarov, M. Linck, A. Fleischmann and C. Enss: “High energy resolution X-ray, gamma and electron spectroscopy with cryogenic detectors”, Appl. Radiat. Isot., 60 (2004) 363-368
	M. Loidl, E. Leblanc, T. Branger, H. Rotzinger, T. Daniyarov, M. Linck, A. Fleischmann and C. Enss: “Feasibility study of absolute activity measurement with metallic magnetic microcalorimeters”,
	Proc. of the 10th International Workshop on Low Temperature Detectors (LTD-10), Italy, Nucl. Instr. & Meth. A 520 (2004) 73-75
	E. Leblanc, “Développements récents sur les détecteurs cryogéniques, applications dans la recherche et l’industrie”, Radioprotection, Vol. 39 N°4 (2004) 535-547
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CONTACT	Elvire Leblanc

LABORATORY	LNE-Laboratoire National Henri Becquerel
NAMES	C. Bobin, J. Bouchard
APPARATUS ACTIVITY	$4\pi\beta-\gamma$ counting systems
IN PROGRESS	Development of a 4π(LS)$\beta-\gamma$ anticoincidence counting system using a liquid scintillation apparatus in the β-channel; TDCR measurements are combined with the coincidence method. Application to the standardisation of radioactive solutions (^{111}In, ^{201}Tl, ^{67}Ga). ^{56}Mn activity measurement using Cherenkov counting in the β-channel.
SOURCE IN PREPARATION	Bobin, C., Bouchard, J.: A 4π(LS)$\beta-\gamma$ coincidence system using a TDCR apparatus in the β-channel. To be published in Applied radiation and Isotopes.
ADDRESS	DRT/DeTeCS/LNHB CEA-Saclay F-91191 Gif-sur-Yvette cedex, FRANCE Tel. : 33 1 69 08 29 64 Fax : 33 1 69 08 26 19 e-mail : christophe.bobin@cea.fr
CONTACT	Christophe Bobin

LABORATORY	LNE- Laboratoire National Henri Becquerel
NAMES	M.C. Lépy, J. Plagnard, C. Collin
ACTIVITY	Gamma-ray spectrometry
APPARATUS	HPGe Detectors
RESULTS	Efficiency calibration of HPGe detectors within 0.5% for point sources. Characterization of digital signal processor systems
PUBLICATIONS	
IN PROGRESS	Tests of the ETNA code for coincidence summing corrections Monte Carlo simulation of the detector for different source-detector geometries Study of ^{153}Sm gamma emission intensities
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CONTACT	Marie-Christine Lépy

LABORATORY	LNE - Laboratoire National Henri Becquerel
NAMES	M.C. Lépy, J. Plagnard.
ACTIVITY	X-ray spectrometry
APPARATUS	Si(Li) and HPGe Detectors Tunable monochromatic X-ray source (1-20 keV) (SOLEX)
RESULTS	Characterization of semiconductor detectors in the 1-15 keV energy range Measurement of linear attenuation coefficients of liquid scintillators for low-energy photons
IN PROGRESS	Development of a reference detector for semiconductor detectors efficiency calibration using the SOLEX source Study of the metrology beamline that will be installed at the SOLEIL synchrotron facility Preparation of the European X-Ray Spectrometry Conference (EXRS2006) in Paris
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CONTACT	Marie-Christine Lépy

LABORATORY	LNE-Laboratoire National Henri Becquerel
NAMES	P. Cassette, F. Jaubert, I. Tartes
ACTIVITY	Liquid Scintillation Counting
APPARATUS	Triple coincidence counters Commercial LS counters
RESULTS	Development of TDCR and tracer LS methods
PUBLICATIONS	P. Cassette and J. Bouchard. The design of a liquid scintillation counter based on the triple to double coincidence ratio method. Nuclear Instruments and Methods in Physics Research A 505 (2003) 72-75. F. Jaubert and P. Cassette. Standardization of a ^{32}P solution containing pure-beta impurities using the TDCR method in liquid scintillation counting. Applied Radiation and Isotopes, 60 (2004) 601-606. P. Cassette, M.M. Bé, F. Jaubert and M.C. Lépy. Standardization of a ^{103}Pd solution using the TDCR method in LSC. Applied Radiation and Isotopes, 60 (2004) 439-445.
IN PROGRESS	Standardization of ^{186}Re, ^{93}Zr and ^{79}Se Study of new photodetectors for a TDCR counter
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CONTACT	Philippe Cassette

LABORATORY	LNE-Laboratoire National Henri Becquerel
NAMES	Doru Stanga* (IFIN-HH), P. Cassette, I. Moreau
ACTIVITY	Radioactive gas standardization
APPARATUS	Triple proportionnal counters Tritiated water to tritium gas converter
RESULTS	Standardization of ^{85}Kr, ^{133}Xe and ^{3}H
PUBLICATIONS	D. Stanga, P. Cassette, J.L. Picolo, I. Moreau. A new tritium gas generator for the activity measurement of tritiated water by internal gas proportional counting. 7th International conference on tritium science and technology, Baden-Baden, September 2004. To be published by Fusion Science and Technology.
IN PROGRESS	Measurement of tritiated water by gas counting and LSC
ADDRESS	DRT/DeTeCS/LNHB CEA-Saclay F-91191 Gif-sur-Yvette cedex, FRANCE Tel : 33 1 69 08 48 68 Fax : 33 1 69 08 26 19 E-mail : Philippe.cassette@cea.fr
CONTACT	Philippe Cassette

LABORATORY	LNE-Laboratoire National Henri Becquerel
NAMES	Li Mo* (ANSTO), P. Cassette, F. Jaubert
ACTIVITY	Liquid Scintillation Counting
APPARATUS	Triple coincidence counters Commercial LS counters
RESULTS	Study of the effect of the LS counters adjustments for TDCR and CIEMAT/NIST methods
PUBLICATIONS SUBMITTED	Li Mo, P. Cassette and C. Baldock. The influence of rejection of a fraction of single electron peak in liquid scintillation counting. Submitted to Nuclear Instruments and Methods in Physics Research A.
IN PROGRESS	TDCR and CIEMAT/NIST detection efficiency calculation programs for various counter threshold adjustments
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CONTACT	Philippe Cassette

LABORATORY	LNE-Laboratoire National Henri Becquerel
NAMES	W. M. van Wyngaardt* (CSIR-NML), P. Cassette, F. Jaubert, I. Tartes
ACTIVITY	Liquid Scintillation Counting
APPARATUS	Triple coincidence counters Commercial LS counters
RESULTS	Study of a reference LSC cocktail
IN PROGRESS	Study of a xylene-based cocktails of various compositions (efficiency and stability of LS sources of various radionuclides)
ADDRESS	DRT/DeTeCS/LNHB CEA-Saclay F-91191 Gif-sur-Yvette cedex, FRANCE Tel : 33 1 69 08 48 68 Fax : 33 1 69 08 26 19 E-mail : Philippe.cassette@cea.fr
CONTACT	Philippe Cassette

LABORATORY	Physikalisch-Technische Bundesanstalt
NAMES	D. Arnold and R. Tuckermann
APPARATUS ACTIVITY	Development of calibration facilities including a reference chamber for thoron (^{220}Rn) decay products.
RESULTS	
PUBLICATIONS	
IN PROGRESS	Determination of the chamber design and the instrumentation
INFORMATION	The project is supported by the German ministry of the environment.
SOURCE IN PREPARATION	
ADDRESS	Physikalisch-Technische Bundesanstalt Department 6.1 Bundesallee 100, D-38116 Braunschweig, Germany Telephone: +49-531-592-6120 Telefax: +49-531-592-6109 E-mail: Dirk.Arnold@ptb.de
CONTACT	Dirk Arnold

LABORATORY	Physikalisch-Technische Bundesanstalt
NAMES	R. Dersch
APPARATUS ACTIVITY	NaI-detector secondary measurment system and α-spectrometric primary system for the production of gaseous ^{222}Rn standards. Establishing of a NaI-detector measurement system for stand alone ^{222}Rn activity determintions.
RESULTS	An NaI-detector measurement system has been established as a stand alone system for ^{222}Rn activity determinations based on the α-spectrometric measurements of radon at a cold point in a defined solid angle. With known activities from the primary measurement system and with an almost complete (>99,9%) transfer a set of vessels, stainless steel cylinders and glass bulbs, have been calibrated.
PUBLICATIONS	
IN PROGRESS	Preparation of gaseous radon standards in BIPM gas ampoules for the international reference system SIR. General overhaul and partly renewing of the primary α-spectrometric measurement system.
INFORMATION	
SOURCE IN PREPARATION	
OTHER RELATED PUBLICATIONS	
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CONTACT	Rainer Dersch

LABORATORY	Physikalisch-Technische Bundesanstalt
NAMES	A. Honig, A. Röttger, R. Dersch, T. Reich
APPARATUS ACTIVITY	Radon-222, Radon-222-progenies and Radon-220 reference chamber of the PTB. Production and measurement of radon reference atmospheres and radon progeny reference atmospheres.
RESULTS	$c(^{222}Rn)$ from 1 kBq m^{-3} to 100 kBq m^{-3}, F for ^{222}Rn from 0.1 to 1.0, f_p from 0.01 to 0.9, $c(^{220}Rn)$ from 1 kBq m^{-3} to 10 kBq m^{-3}
PUBLICATIONS	
IN PROGRESS	Calibration of active and passive radon detectors
INFORMATION	^{222}Rn-reference atmospheres up to 100 kBq/m^3
SOURCE IN PREPARATION	
OTHER RELATED PUBLICATIONS	
ADDRESS	Physikalisch-Technische Bundesanstalt Department 6.1 Bundesallee 100, D-38116 Braunschweig, Germany Telephone: +49-531-592-6103 Telefax: +49-531-592-8525 E-mail: Anja.Honig@ptb.de
CONTACT	Anja Honig

LABORATORY	Physikalisch-Technische Bundesanstalt
NAMES	Karsten Kossert
APPARATUS	Liquid scintillation counters
ACTIVITY	Activity measurements (e.g. internat. comparisons of ^{32}P) Half-life measurements of long-lived and short-lived isotopes (with several collaborators) P_γ of ^{40}K (together with Dirk Arnold, PTB)
RESULTS	P_γ of ^{40}K, half-life of ^{90}Y
PUBLICATIONS	Kossert, K.; Schrader, H.: Activity standardization by liquid scintillation counting and half-life measurement of ^{90}Y. ARI 60 (2004) 741-749
IN PROGRESS	Activity/half-life measurements of ^{10}Be and ^{40}K (collaborations with TU Munich and Uni. Bern, respectively) Measurement of the half-lives of the long-lived isotopes ^{147}Sm and ^{176}Lu Development of a new method for secondary activity standardizations by liquid scintillation counting.
SOURCE IN PREPARATION	Kossert, K.: A new method for secondary standard measurements with the aid of liquid scintillation counting. Accepted contribution for the ICRM conference 2005 in Oxford
OTHER RELATED PUBLICATIONS	Kossert, K.; Günther, E.: LSC measurements of the half-life of ^{40}K. ARI 60 (2004) 459-46 Kossert, K.: Half-life measurement of ^{87}Rb by liquid scintillation counting. ARI 59 (2003) 377-382
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CONTACT	Karsten Kossert

LABORATORY	Physikalisch-Technische Bundesanstalt
NAMES	A. Röttger and A. Honig
APPARATUS ACTIVITY	Radon reference chamber of the PTB. Production and measurement of radon reference atmospheres. Euromet project 657: Comparison of calibration facilities for the radon activity concentration
RESULTS	Determination of calibration factors and comparison reference values for 1 kBq/m^3, 3 kBq/m^3 and 10 kBq/m^3 in the scope of the Euromet project 657 Measurement of aerosol size distributions from 2 nm to 1000 nm.
PUBLICATIONS	Final report of Euromet project 657, BIPM supplementary comparison, Technical Supplement reference number: Rn-222, volume 42
IN PROGRESS	Production of reference atmospheres with nanometer aerosol content
INFORMATION	Euromet comparison for the radon activity concentration. 12 participants from 9 nations just finished, publication in preparation, see below.
SOURCE IN PREPARATION	Euromet project 657 - publication of the results
OTHER RELATED PUBLICATIONS	
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CONTACT	Annette Röttger

LABORATORY	Physikalisch-Technische Bundesanstalt
NAMES	Heinrich Schrader
APPARATUS ACTIVITY	Photon-photon (NaI) coincidence counting system with distance variation and efficiency extrapolation.
RESULTS	Determination of the activity concentration of the ^{125}I solution for the BIPM comparison.
PUBLICATIONS	H. Schrader and K. F. Walz: *Standardization of ^{125}I by photon-photon coincidence counting and efficiency extrapolation*. Appl. Radiat. Isot. **38** (1987) 763 - 766 H. Schrader: *Standardization of ^{129}I by a tracer method with photon-photon coincidences from the decay of ^{125}I*. Appl. Radiat. Isot. **41** (1990) 417 - 421 H. Schrader: *Photon-photon coincidences for activity determination: I-125 and other radionuclides*. Accepted contribution to the Conference on Radionuclide Metrology and its Applications in Oxford (ICRM 2005).
IN PROGRESS	Tests performed to study the feasability of the method for various nuclides and nuclide mixtures such as ^{125}I + ^{109}Cd, ^{125}I + ^{124}I, ^{111}In, ^{241}Am etc.
INFORMATION	
SOURCE IN PREPARATION	
OTHER RELATED PUBLICATIONS	
ADDRESS	Physikalisch-Technische Bundesanstalt Department 6.1 Bundesallee 100, D-38116 Braunschweig, Germany Telephone: +49-531-592-6322 Telefax: +49-531-592-6305 E-mail: Heinrich.Schrader@ptb.de
CONTACT	Heinrich Schrader

LABORATORY	National Office of Measures (OMH), Radiation Physics Section
NAMES	K. Rózsa, L. Szucs, A. Zsinka
APPARATUS	4πβ(PC)-γ(NaI) coincidence and anti-coincidence counting system. Calibrated γ-ray spectrometer with HPGe semiconductor detector. Calibrated 4πγ ionisation chamber. Well type NaI(Tl) scintillation detector.
ACTIVITY	Activity calculations of ^{125}I using the sum-peak coincidence counting described by ELDRIDGE and CROWTHER (4P-NA-MX-00-00-00) $$A = K\frac{(A_1 + 2A_2)^2}{mA_2}$$ where: m = source mass K=(0.2494 ± 0.0005) (k=3), which has been determined by the decay-scheme parameters.
RESULTS	Participation in the BIPM CCRI(II) K2 key comparison: standardisation of ^{125}I solution by sum-peak coincidence counting. Participation in the BIPM SIR K1 key comparison: standardisation of ^{134}Cs solution by 4πβ-γ coincidence and anti-coincidence counting
IN PROGRESS	Participation in the BIPM CCRI(II) K2 key comparison: standardisation of ^{85}Kr.
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CONTACT	András Zsinka

LABORATORY	National Office of Measures (OMH), Radiation Physics Section
NAMES	K. Rózsa, L. Szucs, A. Zsinka
APPARATUS	4πβ(PC)-γ(NaI) and 4πβ(PPC)-γ(NAI) coincidence and anti-coincidence counting system. 4πβ counting system. Calibrated γ-ray spectrometer with HPGe semiconductor detector. Calibrated 4πγ ionisation chambers. Capintec CRC-15R Radioisotope Calibrator. Multi-wire proportional counter for wide area sources. Certified reference solutions and wide area reference sources.
ACTIVITY	Periodical metrological supervision of radionuclide calibrators used in Hungarian medical practice. Periodical metrological supervision of surface contamination monitors. Preparation of radioactive certified reference materials.
RESULTS	Calibration factors for radionuclides identified.
ADDRESS	National Office of Measures H-1535 BUDAPEST, P.O.Box 919. Hungary Phone: (36-1) 458-5800 Fax: (36-1) 458-5937 E-mail: L.Szucs@omh.hu
CONTACT	László Szucs

(SA1/SA2)

LABORATORY	Bhabha Atomic Research Centre
NAMES	Leena Joseph, Anuradha R., D.B. Kulkarni
APPARATUS	1. 4π β(PC) γ(NaI) coincidence system. 2. Calibrated 4π Gamma ion chamber. 3. HPGe detector assembly for gamma ray spectrometer.
ACTIVITY	1. Participating in international intercomparison programmes of activity measurements organized by BIPM and APMP. 2. Standardization of radioactive sources and solutions 3. Coordinated research project of IAEA - Harmonization of quality practices in nuclear medicine radioactivity measurement 4. Organizing national intercomparison of activity measurements of ^{131}I among hospitals in the country. 5. Gamma ray spectrometry and activity measurements.
RESULTS	1. ^{54}Mn standardized under international intercomparison programme of BIPM deviated by < 0.1% from the arithmetic mean value of all the participating laboratories. 2. Standardized ^{241}Am, ^{125}I under international intercomparison of activity measurements organized by BIPM. 3. Standardized sources for users
IN PROGRESS	1. Standardisation of ^{32}P under international intercomparison of BIPM is on going. 2. ^{110m} Ag standardized for SIR program. 3. ^{134}Cs and ^{65}Zn under SIR is to be standardised. 4. Standard ^{131}I are to be sent to those Nuclear Medicine Centres (NMC) whose have deviated >±10% in the national intercomparison programme of activity measurements organized among NMC's by BARC.
PUBLICATION	1. "Standardization of ^{192}Ir solution at BARC", Anuradha R., Leena Joseph, D.B. Kulkarni, R. Nathuram, V.V. Shaha and D.N. Sharma, International Journal of Applied Radiation and Isotopes, 62(2005) 645-648. 2. "Efficiency of HP Germanium detector", R. Nathuram, D.B. Kulkarni, Leena Joseph, Anuradha.R and V.V. Shaha, National Symposium on Nuclear Instrumentation, IGCAR, Kalpakkam, Feb. 2004.
ADDRESS	Head , Radiation Standards Section, Radiation Safety Systems Division, BARC, Mumbai - 400 085, India Telephone : 0091 22 25595074 Telefax : 0091 22 25505151 / 25519613 Telex : 011-61017 BARC IN E-mail : vvshaha@apsara.barc.ernet.in
CONTACT	V.V. Shaha

(SA1/SA2)

LABORATORY	Bhabha Atomic Research Centre
NAMES	U.V. Phadnis, V. Sathian, G. Shobha
APPARATUS	1. Manganese Sulphate Bath System. 2. Standard Thermal Neutron Assembly in Graphite 3. Precision Long Counter. 4. Multi-spheres for spectroscopy. 5. 4p polythene assembly. 6. Activation foils (Threshold detectors). 7. He-3 & BF_3 based thermal neutron fluence rate measuring systems. 8. Neutron rem counter and flux meter. 9. Standard neutron sources including D_2O moderated ^{252}Cf source. 10. Water moderator based thermal neutron jig. 11. Bonner's spheres neutron spectrometry system
ACTIVITY	1. Standardization of radioactive neutron sources. 2. Standardization of fluence rate and dose rate. 3. Calibration of neutron monitors. 4. R&D work associated with neutron standards.
RESULTS	1. Neutron sources were standardized for various users. 2. Neutron fluence rate and dose rate were standardized for various users. 3. More than fifty neutron monitors were calibrated. 4. Shielding properties of different materials for neutrons were studied
IN PROGRESS	• Development of Neutron Spectrometer.
INFORMATION	• Fast neutron source yield and the thermal neutron fluence rate can be taken up for international intercomparison.
PUBLICATIONS	1. **"**Studies of silicon based neutron detector**",** C.G. Panchal, A. Topkar, S.K. Kataria, A.L Pappachan and V. Sathian, CNIRD-2005, March 2-4, 2005, Jodhpur. 2. **"**Performance Evaluation of Start up Counters and Ion Chambers used in Protective and Regulatory Channels of Power Reactors**",**

S.M. Tripathi, Suresh Rao, R.A. Satam, V. Sathian, Shobha Ghodke, A. K. Mahant and V. V. Shaha, CNIRD-2005, March 2-4,2005, Jodhpur.

3. **"**Measurement of Neutron Sensitivity of Self Powered Neutron Detectors**",** A.K. Mahant, Yeshuraja V. and Shobha Godke, CNIRD-2005, March 2-4, 2005, Jodhpur

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LABORATORY	ENEA - Istituto Nazionale di Metrologia delle Radiazioni Ionizzanti - Italy
NAMES	M. Capogni, P. De Felice
APPARATUS	Liquid Scintillation counting equipment
ACTIVITY	Development of a new primary standard of F-18 for PET
IN PROGRESS	Study of experimental aspects concerning source preparation and measurement procedures for this radionuclide. A scientific collaboration between INMRI-ENEA, JRC-Ispra and Amersham Health is in progress.
ADDRESS	ENEA Istituto Nazionale di Metrologia delle Radiazioni Ionizzanti Centro Ricerche Casaccia P.0.Box 2400 - Roma (Italy) Phone: +39 06 30486628 Fax: +39 06 30486097 marco.capogni@casaccia.enea.it
CONTACT	M. Capogni

(SA1/SA2)

LABORATORY	Nagoya University
NAMES	H. Miyahara, K. Morita
APPARATUS	4πβ(ppc)-γ(HPGe) and 4πβ(pc)-γ(HPGe) coincidence apparatus using a live-timed two-dimensional data-acquisition system, and γ-ray spectrometry system
RESULTS	1. The emission probability for the 616.3 keV γ-ray of ^{80}Br was measured to be 0.0614(5). 2. The emission probabilities for the 316.4 and 469.4 keV γ-rays of ^{105}Ru were measured to be 0.1128(6) and 0.1827(10), respectively.
PUBLICATIONS	1. Emission Probability Measurement of 94.7 keV Gamma-ray for ^{165}Dy, H. Miyahara et al., Nucl. Instr. and Meth. A516 (2004) 104. 2. Precise Measurement of the Emission Probability for the 543 keV Gamma-ray for ^{199}Pt, H. Miyahara et al., Appl. Radiat. and Isot. 60 (2004) 289. 3. Highly Precise Measurement of the Relative Gamma-ray Intensities for ^{56}Mn snd ^{72}Ga, H. Miyahara et al., Appl. Radiat. and Isot. 60 (2004) 295. 4. Gamma-Ray Emission Probability Measurement of ^{147}Eu, H. Miyahara et al., Nucl. Instr. and Meth. A523 (2004) 96. 5. Evaluation of Neutron Dose to Radioterapy Patients Treated with 10 MV X-ray Baems Based on Photoneutron Spectrometry, T. Aoyama et al., Jpn. J. Health Phys. 39 (2004) 130. 6. Gamma-Ray Emission Probability Measurement of ^{149}Eu, H. Miyahara et al., Nucl. Instr. and Meth. A523 (2004) 96.
IN PROGRESS	The γ-ray emission probabilities of ^{105}Rh and ^{162}Pr are measuring.
ADDRESS	Department of Radiological Technology, School of Health Sciences, Nagoya University, 1-1-20 Daikominami, Higashi-ku, Nagoya, 461-8673 JAPAN Telephone 81-52-719-1548, Facsimile 81-52-719-1506 E-mail miyahara@met.nagoya-u.ac.jp
CONTACT	Hiroshi Miyahara

LABORATORY	National Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology (NMIJ/AIST)
NAMES	Yoshio HINO, Akira YUNOKI and Yasushi SATO
APPARATUS	4πβ(pc)-γ(NaI) and 4πβ(ppc)-γ(Ge) coincidence systems, Calibrated 4πγ ionisation chamber, HP-Ge and Si(Li) detectors, Liquid scintillation system, Imaging analyser system, PIPS for α counting and 2π multi wire chamber.
RESULTS	1. Participate the CCRI-II Key-comparisons of I-125 and 2nd run of P-32. 2. APMP comparison (APMP-RI(II)-K3-04) for the activity measurements of Ce-139 was carried out. In total, 8 labs from 3 RMO have taken part in this comparison. 3. Bilateral comparisons of Cs-134 measurement between VNIIM and BNM-LNHB were carried out.
PUBLICATIONS	Y. Sato and Y. Hino, "The new fabrication method of standard surface sources." Appl. Radiat. Isotopes 60(2004) 543-546. Y. Kawada, M. Ohtuka, Q.W. Wang and Y. Hino, "Absolute radioactivity measurements by the use of a 4πβ-4πγ detector configuration." Appl. Radiat. Isotopes 60(2004) 357-362
IN PROGRESS	" Response calculation for standard ionization chambers in APMP using EGS4 Monte Carlo Code." to be presented in the ICRM'2005 " Standardization of ^{152}Eu, ^{154}Eu by 4πβ-4πγ coincidence method and 4π(β+γ) integral counting." to be presented in the ICRM'2005
INFORMATION	1. Logarithmic scale surface sources with imaging plate have been studied for low level activity measurement. 2. Calibration factors of ionization chambers in APMP resion were measured with several ampoule sources from NMIJ.
ADDRESS	Radioactivity and Neutron Standardization Section, Quantum Radiation Division, AIST Tsukuba central-2 1-1-1 Umezono, Tsukuba, Ibaraki, 305-8568 JAPAN Tel.: (+81) 29 861 5667, Fax.: (+81) 29 861 5673 E-mail : y.hino@aist.go.jp, Web: http://www.aist.go.jp
CONTACT	Yoshio HINO

LABORATORY	Laboratory of Radioactive Standards, RC POLATOM
NAMES	Ryszard BRODA
ACTIVITY	Participation in: 12th Meeting of QS-Forum, BIPM Workshop on CCRI(II) Activity Comparisons, 14th ICRM Conference, 17th Meeting of CCRI(II). Participation in the ^{54}Mn, ^{60}Co, ^{192}Ir, ^{241}Am, ^{55}Fe and ^{125}I intercomparisons. Contract on the "Standardising of radionuclides by the TDCR method", European Commission Center of Excelence IDRANAP (IFIN-HH, Bucharest, Romania).
RESULTS	Amelioration of the IFIN TDCR system and codes for activity determination. The measurement of the commercial ^{14}C and ^{3}H source was compatible with the assumed reference activity within less than 1 %.
PUBLICATIONS	R. Broda, A. Jeczmieniowski. Statistics of the LS-detector in the case of low counting efficiency. Appl. Radiat. Isot., 60 (2004) 453-458. G. Ratel, C. Michote, R. Broda, A. Listkowska. Activity measurements of the radionuclide ^{60}Co for the RC, Poland in the ongoing comparison BIPM.RI(II)-K1.Co-60. BIPM, Report-Co-60 (3), 2003/09/09. R. Broda (2003). A review of the triple-to-double coincidence ratio (TDCR) method for standardizing radionuclides. Appl. Radiat. Isot., 58 (2003) 585-594. R. Broda (2003). The national standard of radionuclide activity unit, (in Polish), Pomiary Automatyka Robotyka, 7-8 (2003) 51-55.
IN PROGRESS	Application for the laboratory accreditation by Polish Center for Accreditation.
SOURCE IN PREPARATION	A.C.Razdolescu, R.Broda, P.Cassette, B.Simpson. The IFIN-HH triple coincidence liquid scintillation counter. (ICRM'05)
ADDRESS	Radioisotope Centre POLATOM, 05-400 Otwock-Swierk, Poland, e-mail: r.broda@polatom.pl tel.: (48 22) 718 07 21 fax: (+48 22) 718 03 50
CONTACT	Ryszard Broda

LABORATORY	Laboratory of Radioactive Standards, RC POLATOM
NAMES	Krzysztof MALETKA
APPARATUS	Gamma spectrometer with the HPGe detector. LS-spectrometer beta WALLAC 1411. MAD2000 dose calibrator.
ACTIVITY	Participation in the International Conference on Isotopic and Nuclear Analytical Techniques for Health and Environment. Vienna, Austria, 10-13.06.2003. Participation in the ^{192}Ir and ^{241}Am intercomparisons. Measurements of radionuclidic purity in radioactive materials and of dose rate from ophtalmic applicators.
RESULTS	Investigation of the LS-cocktail showed that the Ultima Gold liquid scintillator quenched by nitropropan changed its property under the influence of high radiation dose.
IN PROGRESS	Application for the laboratory accreditation by Polish Center for Accreditation.
SOURCE IN PREPARATION	R. Broda, A. Listkowska, K. Maletka, A. Muklanowicz. Metrological laboratory in RC POLATOM. (paper for the National Conference on Nuclear technique in industry, medicine, agriculture and environmental protection).
ADDRESS	Radioisotope Centre POLATOM 05-400 Otwock-Swierk, Poland E-mail: k.maletka@polatom.pl Tel.: (+48 22) 718 07 21 Fax: (+48 22) 718 03 50
CONTACT	Krzysztof Maletka

LABORATORY	Laboratory of Radioactive Standards, RC POLATOM
NAMES	Anna LISTKOWSKA
APPARATUS	LS-spectrometer beta WALLAC 1411
ACTIVITY	IAEA fellowship on radiopharmacy (Pavia University, Italy, 1 year). Participation in the ^{54}Mn, ^{60}Co, ^{192}Ir and ^{241}Am, intercomparisons. Preparations of the standard sources and solutions.
PUBLICATIONS	G. Ratel, C. Michote, R. Broda, A. Listkowska. Activity measurements of the radionuclide ^{60}Co for the RC, Poland in the ongoing comparison BIPM.RI(II)-K1.Co-60. BIPM, Report-Co-60 (3), 2003/09/09.
IN PROGRESS	Application for the laboratory accreditation by Polish Center for Accreditation. Elaboration of a new home-made LS-cocktail.
SOURCE IN PREPARATION	R. Broda, A. Listkowska, K. Maletka, A. Muklanowicz. Metrological laboratory in RC POLATOM. (paper for the National Conference on Nuclear technique in industry, medicine, agriculture and environmental protection).
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CONTACT	Anna Listkowska

LABORATORY	National Radiation Standard Laboratory, Institute of Nuclear Energy Research (NRSL/INER)
NAMES	Ming-Chen Yuan, Chien-Yung Yeh, Hsiao-Fang Pang and Wen-Song Hwang
APPARATUS	4πß(pc)-γ(NaI)coincidence system Calibrated 4πγ ionisation chamber HpGe gamma-ray spectrometry system Large area windowless proportional counter
ACTIVITY	1.Standardization of Ga-67 2.Participated in the APMP comparison of Ce-139 3.Joined the "portability of the calibration factors of ionization chambers" program organized by AIST.
RESULTS	1. INER's Ce-139 measurement results were in agreement with the other participants'. 2. INER's Y-88 measurement results have entered the BIPM key comparison database (KCDB) in August 2004.
PUBLICATIONS	Ming-Chen Yuan, Chien-Yung Yeh ,"Evaluation of F-18 radionuclide activity measurement standard", the 8th annual Terry Fox and CGMH international cancer symposium on PET/CT in oncology, 15-16 Oct. 2004.
IN PROGRESS	1.Standardization of I-131 2.Cs-134 bilateral comparison with NMIJ/Japan 3. APMP C-14 key comparison piloted by KRISS/Korea 4.Setting up an environmental level gamma-ray spectrometry system 5.Setting up a LSC system
INFORMATION	
SOURCE IN PREPARATION	Ming-Chen Yuan, H.F. Pang, C.F. Wang," Absolute Counting of ^{188}Re Radiopharmaceuticals,", ICRM 2005, 5-9 Sept. 2005.
OTHER RELATED PUBLICATIONS	Optional.
ADDRESS	Health Physics Division, Institute of Nuclear Energy Research P.O. Box 3-10, Longtan 325, Taiwan, Republic of China Tel:886-3-4714088 Fax:886-3-4714132 E-mail:mcyuan@iner.gov.tw
CONTACT	Ming-Chen Yuan

LABORATORY	Institutul National de C&D pentru Fizica si Inginerie Nucleara ”Horia Hulubei” IFIN-HH Radionuclide Metrology Laboratory
NAMES	Enric Leon Grigorescu, Aurelian Luca and Constantin Ivan
APPARATUS ACTIVITY	Gamma-ray spectrometry system with high resolution HP Ge semiconductor detector
RESULTS	- Determination of photon emission intensities for ^{65}Zn, EUROMET Project 721. - Activity measurements of a radioactive solution, “Environmental Radioactivity Comparison Exercise 2003”, NPL, Teddington, United Kingdom. - Activity measurements for different types of samples.
PUBLICATIONS	A. Luca and J. Morel, ”Influence of the background approximation methods on the analysis of γ-ray spectra”, Appl. Radiat. Isot. 60, 2-4, (2004), 233 – 237.
IN PROGRESS	- Full-energy absorption peak efficiency calibrations for volume radioactive sources. - Elaboration of Quality Assurance procedures.
INFORMATION	
SOURCE IN PREPARATION	E. Neacsu, A. Luca, V. Stefan and A. Zorliu, “Romanian experience on wet storage spent nuclear fuel at VVR-S research reactor of IFIN “Horia Hulubei”, EC-JRC-IRMM, Proceedings of NEMEA-2 Conf., October 2004, Romania.
OTHER RELATED PUBLICATIONS	A. Luca – “Spectrometrie gama de nivel redus prin metoda coincidentelor si anticoincidentelor. Aplicatii” (in Romanian) [Low level gamma-ray spectrometry by coincidence and anticoincidence method. Applications], Ph D Thesis, University of Bucharest, Romania, 2004.
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CONTACT	Phys. Eng. Aurelian Luca

LABORATORY	Institutul National de C&D pentru Fizica si Inginerie Nucleara"Horia Hulubei" IFIN-HH Radionuclide Metrology Laboratory
NAMES	A.C.Razdolescu, E.L.Grigorescu, Ph.Cassette, R.Broda, C.Ivan, M.Sahagia
APPARATUS ACTIVITY	LSC-TDCR
RESULTS	Measurement of: ^{241}Am (CIPM-key comparison); ^{3}H, ^{14}C. Improvements made with Ph. Cassette (LNHB) and R.Broda (RC) at the installation
PUBLICATIONS	Anamaria Cristina Razdolescu, Ph.Cassette "Standardization of tritiated water and ^{204}Tl by TDCR liquid scintillation counting" Appl. Radiat.Isot. 60(2004)493-497
IN PROGRESS	Measurement of ^{63}Ni, ^{99m}Tc. Implementation of the QS by issue of technical procedures
INFORMATION	
SOURCE IN PREPARATION	E.L.Grigorescu, A.C.Razdolescu, M.Sahagia, P.Cassette, "Calibration of tritium monitors using saturated vapors of tritiated water" , Fusion Science and Technology, Conference, Baden-Baden, Germany, September 2004, accepted for publication
OTHER RELATED PUBLICATIONS	M.Sahagia, A.C.Razdolescu, E.L.Grigorescu, A.Luca, C.Ivan "Results Obtained by the Radionuclide Metrology Laboratory of IFIN-HH in International Comparisons, during the Period 2002-2004', 5-th International Balkan Workshop of Applied Physics, Constanta, Romania, 5-7.07.2004, Accepted at Rom.J.Phys. A.C.Razdolescu, M.Sahagia, E.L.Grigorescu, " Comparative measurements of Ni-63, Cs-137, Am-241", 5-th International Balkan Workshop of Applied Physics, Constanta, Romania, 5-7.07.2004, Accepted at Rom.J.Phys.
ADDRESS	Atomistilor Str.407, Magurele, Ilfov County, POB. MG 6, Code 077125, Romania Tel +40214042300/4517, Fax +40214574432, +40214574440, E-mail <razdo@yahoo.com>
CONTACT	Anamaria Cristina Razdolescu

LABORATORY	Institutul National de C&D pentru Fizica si Inginerie Nucleara"Horia Hulubei" IFIN-HH Radionuclide Metrology Laboratory
NAMES	M.Sahagia, E.L.Grigorescu, A.C.Razdolescu, C.Ivan
APPARATUS ACTIVITY	4πPC-γ Coincidence
RESULTS	Measurement of: ^{241}Am (CIPM-key comparison); ^{125}I (CIPM-key comparison, Brinkman method); ^{65}Zn (EUROMET 721 action); ^{99m}Tc, ^{177}Lu
PUBLICATIONS	M.Sahagia, C.Ivan, E.L.Grigorescu ,M.Capogni ,P.De Felice, A.Fazio," Standardization of ^{65}Zn by the 4pPC-γ efficiency extrapolation method", Appl.Radiat.Isot .60,2-4,(2004)423 – 427 E.L.Grigorescu, C.D.Negut, A.Luca, A.C.Razdolescu, M.Tanase "Standardization of ^{68}(Ge+Ga)" Appl. Radiat.Isot. 60(2004)429-431
IN PROGRESS	Remeasurement of ^{99m}Tc, ^{125}I (gamma-gamma coincidence) ,^{131}I, ^{133}Ba Implementation of the QS, by issue of technical procedures
INFORMATION	
SOURCE IN PREPARATION	M. Sahagia*, A. C. Razdolescu, E.L.Grigorescu, A.Luca, C.Ivan, Valeria Lungu, The Standardization of ^{177}Lu and its use in Nuclear Medicine, EC-JRC-IRMM, NEMEA-2 Conf. 20-23 October 2004, Romania, accepted for Proceedings
OTHER RELATED PUBLICATIONS	M.Sahagia, A.C.Razdolescu, E.L.Grigorescu, A.Luca, C.Ivan "Results Obtained by the Radionuclide Metrology Laboratory of IFIN-HH in International Comparisons, during the Period 2002-2004', 5-th International Balkan Workshop of Applied Physics, Constanta, Romania, 5-7.07.2004, Accepted at Rom.J.Phys. A.C.Razdolescu, M.Sahagia, E.L.Grigorescu, " Comparative measurements of Ni-63, Cs-137, Am-241", 5-th International Balkan Workshop of Applied Physics, Constanta, Romania, 5-7.07.2004, Accepted at Rom.J.Phys .

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CONTACT	Dr. Maria Sahagia

LABORATORY:	D.I. Mendeleyev Institute for Metrology (VNIIM) www.vniim.ru
NAMES:	A.V. Zanevsky, M.A. Rasko, E.E. Terechtchenko I.A. Sokolova, A.E. Kochin, N.I. Karmalitsyn
APPARATUS:	$4\pi\beta$(PC)-γ(NaI(Tl)) and KX(0.1mm NaI(Tl))-γ(NaI(Tl))-coincidence counting systems, $4\pi\beta$(PC)-counting system.
RESULTS:	Participation in the APMP key comparisons of activity measurements of ^{51}Cr, ^{139}Ce. Participation in the CCRI key comparisons of ^{125}I activity measurements.
IN PROGRESS:	Participation in the APMP key comparisons of ^{134}Cs activity measurements.
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CONTACT:	A.V. Zanevsky

LABORATORY:	D.I. Mendeleyev Institute for Metrology (VNIIM) www.vniim.ru
NAMES:	E. Terechtchenko, M. Rasko
APPARATUS:	System of calibrated HPGe and Ge(Li) spectrometers.
ACTIVITY:	Calibration of semiconductor detectors at close distance. Experimental check of the cascade summation coefficient obtained by ETNA – program (LNHB, M-C. Lepy et al.)
RESULTS:	1. Definition of the full and photo - efficiency of semiconductor detectors within the range from 59 to 2754 keV. 2. Definition of the cascade summation coefficient in the range from 59 to 2754 keV for semiconductor detectors.
IN PROGRESS:	The paper will be presented at ICRM-2005
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CONTACT:	E. Terechtchenko

LABORATORY:	D.I. Mendeleyev Institute for Metrology (VNIIM) www.vniim.ru
NAMES:	E. Terechtchenko, G. Shukin, K. Bagaev, M. Rasko
APPARATUS:	System of calibrated HPGe and Ge(Li) spectrometers.
ACTIVITY:	Development of the program “SPCRestore” for unfolding of the continuous x-ray and Bremsstrahlung spectra.
RESULTS:	Unfolding of the Bremsstrahlung spectrum of sources on the basis of ^{147}Pm, ^{204}Tl, ^{14}C radionuclides
IN PROGRESS:	Using the “SPCRestore” program for unfolding of X-ray pulse-high medical apparatus
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CONTACT:	E. Terechtchenko

LABORATORY	Slovak Institute of Metrology
NAMES	Jozef Dobrovodský, Tomáš Farkaš, Lucia Pernická, Anton Švec
APPARATUS ACTIVITY	Calibrated $4\pi\ \gamma$ ionization chambers, HPGe spectrometer, large area plastic scintilator α and β measuring system, $4\pi\ \gamma$ ionization chamber and gamaspectrometric detector calibrations
RESULTS	Participation in ^{152}Eu, ^{65}Zn, ^{241}Am, ^{192}Ir, ^{54}Mn and ^{125}I key comparisons, Euromet E634 and Coomet 236/BY/01 intercomparisons.
PUBLICATIONS	Schrader H., Švec A. Comparison of ionization chamber efficiencies for activity measurements. Appl.Rad.Isot. 60 (2004), 2-4, 369 – 378
IN PROGRESS	Large area sources characterisation. Methods for installed radioactivity monitors calibration and verification.
INFORMATION	www.smu.gov.sk
SOURCE IN PREPARATION	Švec A., Janßen H, Pernická L., Klein R., A modified method for the characterisation and activity determination of large area sources. ICRM 2005 conference, Oxford, U.K.
OTHER RELATED PUBLICATIONS	
ADDRESS	Slovak Institute of Metrology, Centre for Ionising Radiation, Karloveská 63, 842 55 Bratislava Tel.: +421 2 60294 671, Fax.: +421 2 60294 670 e-mail: dobrovodsky@smu.gov.sk, svec@smu.gov.sk
CONTACT	Jozef Dobrovodský

LABORATORY	Jozef Stefan Institute, Laboratory for Radiological Measuring Systems and Radioactivity Measurements, High Resolution Gamma-Ray Spectrometry Group
NAMES	M. Korun, D. Glavic-Cindro, T. Vidmar, B. Vodenik
APPARATUS	Calibrated gamma-ray spectrometers, calibration facility for gamma-ray detectors
PUBLICATIONS	T. Vidmar, A. Likar, On the invariability of the total-to-peak ratio in gamma-ray spectrometry, Appl. Radiat. Isotopes, 2004, vol. 60, p. 191-195 M. Korun, Measurements of peak and total efficiencies of low-energy gamma-ray detectors with sources emitting photons in cascade, Appl. Radiat. Isotopes, 2004, vol. 60, p. 207 - 211 D. Glavic-Cindro, M. Korun, Towards establishing traceability of results measured in specific counting conditions in gamma-ray spectrometry, Appl. Radiat. Isotopes, 2004, vol. 60, p. 217 - 220 T. Vidmar, M. Korun, Systematic and non-systematic effects of the uncertainty of the sample position in gamma-ray spectrometry, Appl. Radiat. Isotopes., 2004, vol. 61, p. 401-404 A. Likar, Andrej, T. Vidmar, M. Lipoglavsek, G. Omahen, Monte Carlo calculation of entire in situ gamma-ray spectra, J. Environ. Radioact., 2004, vol. 72, p. 163-168 A. Likar, T. Vidmar, Tim, M. Lipoglavsek, Resolving double peaks in high-resolution spectra by spectrum convolution, J. Phys., D, Appl. Phys., 2004, vol. 37, p. 932-937 D. Glavic-Cindro, M. Korun, B. Vodenik Correlations between the activities of a gamma-ray emitter

	calculated from different peaks in the spectrum, Accred. Qual. Assur., 2004, vol. 9, p. 473 - 477
IN PROGRESS	Measurement of the average paths lengths of gamma-rays in Marinelli beakers, modelling of peak and total efficiencies, library-driven nuclide activity determination without an explicit peak search
SOURCE IN PREPARATION	M. Korun, Optimisation of evaporation and counting times for measurements of short-lived gamma-ray emitters in water samples, to be submitted to Appl. Radiat. Isot. P. DeFelice, A. Fazio, T. Vidmar, Close-geometry efficiency calibration of p-type HPGe detectors with a Cs-134 point source, to be submitted to Appl. Radiat. Isot. T. Vidmar, M. Korun, Calculation of coincidence summing correction factors for extended sources simplified, to be submitted to Appl. Radiat. Isot.
ADDRESS	Jozef Stefan Institute Jamova 39 SI-1000 Ljubljana Slovenia Tel.: +386 1 477 3900 Fax: +386 1 477 3151
CONTACT	M. Korun, E-mail: Matjaz.Korun@ijs.si

(SA1/SA2)

LABORATORY CSIR-National Metrology Laboratory

NAMES Bruce Simpson, Freda van Wyngaardt

Activities undertaken in 2004

- Participated in the international key comparison of activity measurements of ^{125}I organised by the BIPM. Submitted the results obtained by two of four methods investigated.
- Participated in an APMP regional key comparison of ^{139}Ce activity measurement.
- Participated in an APMP regional project to determine ionization chamber calibration factors for ^{51}Cr, ^{57}Co, ^{134}Cs and ^{137}Cs.
- Gave three presentations at the CCRI Section II Activity Comparisons Workshop held at the BIPM.
- Presented a talk on a local ^{131}I comparison exercise at a national conference for physicists in medicine and biology (SAAPMB).
- Measured ^{90}Y solution samples for ANSTO, Australia.
- Underwent a three day laboratory assessment, together with an international technical expert, and received accreditation that complies with ISO/IEC 17025.
- Prepared standards of ^{57}Co for a medical physics company. Measured the activity of ^{131}I, ^{90}Y and ^{99}Mo solutions for a reactor-based isotope production facility. Calibrated two Ionization Chambers for ^{123}I for an accelerator-based isotope production facility and supplied a ^{137}Cs calibration check source. Provided ^{131}I capsule standards for a number of hospitals for measurement and calibration.

Programme for 2005

- Submit a paper for publication on activity comparisons of ^{131}I capsules amongst hospitals in South Africa.
- Participate in an international comparison of calculated spectra of 835 keV photons in a liquid scintillator.
- Participate in the BIPM international key comparison of activity measurements of ^{32}P and others to be selected by CCRI(II) in May.
- Participate in a multi-laboratory comparison of ^{63}Ni activity measurements by the TDCR efficiency calculation technique.
- Prepare two papers that have been accepted for presentation at the ICRM 2005 conference being held at Oxford, UK.
- Publish research results of activity measurements.
- Design and assemble a symmetrical three phototube LS detection system for activity measurement of non-γ-emitting radionuclides.

- Commission a new HPGe detector and Digital Spectrum Analyzer.
- Provide radioactivity standards, sources and calibration services to the user community.

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CONTACT B.R.S. Simpson

LABORATORY	Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT
NAMES	Eduardo García-Toraño, Leonor Rodríguez Barquero, Miguel Roteta, Teresa Crespo, J.M. Los Arcos.
APPARATUS ACTIVITY	Solid state detectors; 4πβ(pc)-γ(NaI) coincidence counter; 4πβ(ppc)-γ(NaI) coincidence counter; large volume proportional counter; liquid scintillation counters.
RESULTS	Standardization of ^{125}I for BIPM international comparison. Standardization of ^{18}F and submission of one ampoule to BIPM for contribution to SIR. Standardization of nuclides by liquid scintillation counting and coincidence measurements. Preparation and standardization of reference solutions of intermediate- and low-activity concentration to be used in an intercomparison organized by the Spanish Regulatory Body (Consejo de Seguridad Nuclear) Standardization of a reference solution used for an intercomparison of analytical laboratories from nuclear power plants.
PUBLICATIONS	E.García-Toraño, M.Roteta and L. Rodríguez Barquero, "Standardization of Ga-67 by 4πγ (NaI) and 4πβ–γ coincidence methods. Applied Radiation and Isotopes 60 (2004) 353. L. Rodríguez Barquero, E. García-Toraño and J.M.Los Arcos, "Standardization of P-32/P-33 and Tl-204 by liquid scintillation counting", Applied Radiation and Isotopes 60 (2004) 615.
ADDRESS	Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT, Avda. Complutense 22, 28040 Madrid, Spain. , e-mail:Jm.losarcos@ciemat.es Phone 34 91 346 6288, FAX : 34 91 346 6442.
CONTACT	José María Los Arcos.

LABORATORY	Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT
NAMES	Teresa Durán, Eduardo García-Toraño.
APPARATUS	Photomultiplier tubes, Hybrid photomultiplier tubes, Radiographic films.
RESULTS	Light emission profiles for scintillation vials measured by autoradiography and PMT direct measurement.
IN PROGRESS	Optical design of the reflector for systems with one PMT or HPMT using standard vials.
SOURCE IN PREPARATION	Paper to be published shortly.
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CONTACT	Teresa Durán

LABORATORY	Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT
NAMES	Eduardo García-Toraño (CIEMAT), Roberto Capote (IAEA).
ACTIVITY	Development of new programs for spectral analysis. Participation in the IAEA Coordinated Research Programme "Development and application of Alpha Particle Spectrometry"
RESULTS	New software made available through IAEA web.
PUBLICATIONS	E. García-Toraño, "A model shape for the analysis of alpha-particle spectra ", Nuclear Instruments and Methods A 498(2003)289-291. R. Capote, E. García-Toraño, E. Maigrena y E. López, " The WINALPHA code for the analysis of alpha-particle spectra", Nucl. Instr. And Methods A 525 (2004)522.
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CONTACT	Eduardo García-Toraño

LABORATORY	Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT
NAMES	Eduardo García-Toraño, Teresa Crespo,
APPARATUS	High resolution alpha spectrometry system, defined solid angle detector.
ACTIVITY	α-particle emission probability (Pα) measurements. Coordination of the "Alpha-Particle Spectrometry Working Group"of the ICRM. Participation (coordination) in the EUROMET 591 project, (Alpha-particle emission probabilities of ^{235}U).
RESULTS	New set of alpha-particle emission probabilities and energies.
SOURCE IN PREPARATION	“Alpha-Particle emission probabilities in the decay of U-235”, Paper sent to NIM A, accepted for publication.
ADDRESS	Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT, Avda. Complutense 22, 28040 Madrid, Spain. , e-mail:E.garciatorano@ciemat.es Phone 34 91 346 6225, FAX : 34 91 346 6442.
CONTACT	Eduardo García-Toraño

LABORATORY	Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT
NAMES	Teresa Crespo, Eduardo García-Toraño
APPARATUS ACTIVITY	Grid ionization chambers, alpha spectrometers with semiconductor detectors, defined solid-angle counter.
RESULTS	Standardization of alpha-emitting radionuclides by $2\pi\alpha$ counting with grid ionization chambers. Preparation of reference solutions. Participation in the BIPM comparison of activity measurements of 241Pu U-series disequilibrium measurements in geological and environmental samples.
PUBLICATIONS	Use Physical Review style. Include only published materials
IN PROGRESS	Use this for description of the current work.
INFORMATION	Use this for evaluations or compilations.
SOURCE IN PREPARATION	Use this to also indicate papers submitted for publication.
OTHER RELATED PUBLICATIONS	M.Jurado, A.Fernández Timón, E.García-Toraño and A. Martín Sánchez, "Application of ion transport simulation to the backscattering in α-particle sources", Nuclear Instruments and Methods B 213(2004)129-133..
ADDRESS	Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT, Avda. Complutense 22, 28040 Madrid, Spain. , e-mail:Teresa.crespo@ciemat.es Phone 34 91 346 6553, FAX : 34 91 346 6442
CONTACT	Teresa Crespo

LABORATORY	IRA-METAS
NAMES	François Bochud Youcef Nedjadi Philippe Spring
APPARATUS ACTIVITY	Participation in the informal LNHB intercomparison on Monte Carlo simulation of 54Mn gamma emission in liquid scintillation measurement.
RESULTS	Response factors of commercially available activimeters to a 90Sr/90Y source measured on 90Y scale.
PUBLICATIONS	Ratel Guy, Michotte Carine, Bochud François; 'BIPM comparison BIPM.RI(II)-K1.Rn-222 of activity measurements of the radionuclide 222Rn'; Metrologia 41; 6002 (2004). Laedermann Jean-Pascal, Valley Jean-François, Bulling Shelley, Bochud François O.; 'Monte Carlo calculation of the sensitivity of a commercial dose calibrator to gamma and beta radiation'; Medical Physics 31; 1614-1622 (2004).
IN PROGRESS	Consolidation of absolute radon measurement. Consolidation of liquid scintillation. Consolidation of NaI 4pi gamma measurement.
INFORMATION	-
SOURCE IN PREPARATION	Intercomparison of activity measurements for beta-emitters in nuclear medicine; submitted to Journal of Nuclear Medicine Technology. Application of the Bayesian theory to low-level activity measurements. Primary measurement of 222Rn by different methods.
OTHER RELATED PUBLICATIONS	-
ADDRESS	Institut universitaire de radiophysique appliquée Grand-Pré 1

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CONTACT François Bochud

LABORATORY	National Physical Laboratory
NAMES	Sean Collins; Andy Pearce
APPARATUS	Environmental Level Gamma Spectrometers
RESULTS	Validated live time correction technique.
IN PROGRESS	Recalibration programme.

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CONTACT	Sean Collins

LABORATORY	National Physical Laboratory
NAMES	Arvic Harms, Chris Gilligan and Simon Jerome
APPARATUS	Liquid scintillation counter
RESULTS	Development of an organically bound tritium standard
PUBLICATIONS	A.V. Harms, S.M. Jerome, Development of an organically bound tritium standard, Appl. Rad. Isot. 61 (2004) 389-393.

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CONTACT	Arvic Harms

LABORATORY	National Physical Laboratory
NAMES	Sean Collins; Andy Pearce
APPARATUS	High Resolution Gamma Spectrometers
RESULTS	Installed and tested new electrically cooled Germanium spectrometer in Radiochemistry suite for use in radiochemical separations.
IN PROGRESS	Redesign of sample holders to improve reproducibility; extensive recalibration programme; development of gamma emission data measurement capability.
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CONTACT	Sean Collins

LABORATORY	National Physical Laboratory
NAMES	Julian Dean, Hilary Phillips, Andrea Woodman, Andy Pearce, Desmond MacMahon
APPARATUS	Internal proportional gas counters
RESULTS	The capability for standardising radioactive gases has been maintained, and samples of ^{85}Kr and ^{133}Xe have been standardised. The calibration system for ^{3}H-in-air monitors has been maintained and used.
IN PROGRESS	Following a recent facilities move, the calibration systems for tritium gas and tritiated water are being recommissioned and tested.
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CONTACT	Julian Dean

LABORATORY	National Physical Laboratory
NAMES	Lena Johansson, Andy Stroak
APPARATUS	$4\pi\beta$(APPC)-γ coincidence counting
RESULTS	Standardisation of I-125 for BIPM key-comparison.
	Standardisation of Zn-65 for Euromet project No. 721 - improvement of nuclear data.
	Standardisation of Tc-99m for submission to the SIR.
IN PROGRESS	Standardisation of Pb-210, U-232 and Pu-241
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LABORATORY	National Physical Laboratory
NAMES	Lena Johansson, Arzu Arinc, Andy Stroak
APPARATUS	$4\pi\beta$(LS)-γ using Digital Coincidence Counting (DCC).
RESULTS	Standardisation of Cr-51 and Tc-99m for submission to the SIR.
IN PROGRESS	Standardisation of Pb-210, U-232, Pu-241
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LABORATORY	National Physical Laboratory
NAMES	Desmond MacMahon, Andy Pearce, Peter Harris
ACTIVITY	Evaluation of discrepant data sets, with specific applications to half-life and gamma ray emission probability data
PUBLICATIONS	Desmond MacMahon, Andy Pearce, Peter Harris, *Convergence of techniques for the evaluation of discrepant data*, App. Rad. Isot. **60** (2004) 275-281.
INFORMATION	Half-lives evaluated: ^{3}H 4497(4) days ^{90}Sr 10551(14) days ^{90}Y 64.063(16) hours ^{137}Cs 10981(11) days Gamma ray emission probabilities evaluated for the IAEA CRP on X- and gamma-ray decay data standards for detector calibration and other applications: ^{56}Co (with C. Baglin, LBNL), ^{94}Nb, ^{103}Ru, ^{106}Ru/^{106}Rh
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