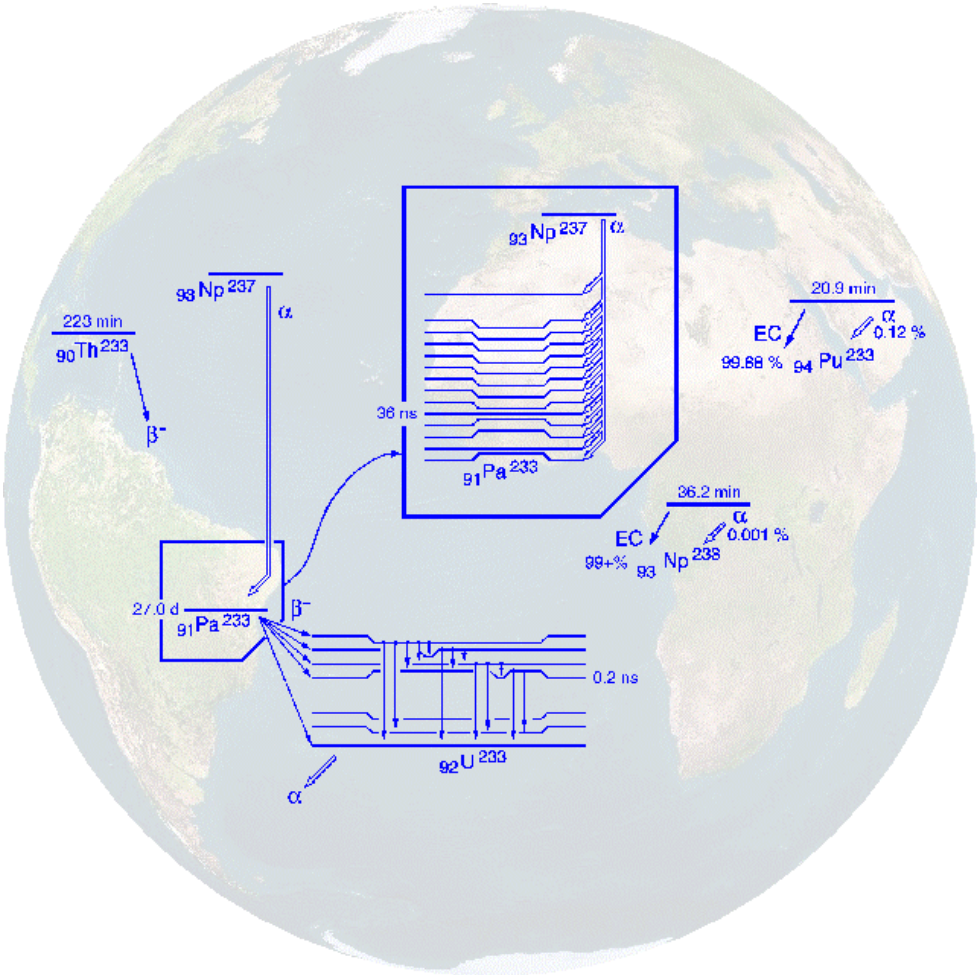
# ICRM NEWSLETTER

**Issue 22 – March 2008**




International Committee for Radionuclide Metrology

Editor : Marie-Martine Bé

LABORATOIRE NATIONAL
HENRI BECQUEREL

# International Committee for Radionuclide Metrology ICRM

# ICRM NEWSLETTER
## Issue 22



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March 2008

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# CONTRIBUTIONS

- ***Australia***
  - Radiation Metrology, ANSTO, Lucas Heights
- ***Austria***
  - IAEA Nuclear Data Section, Vienna
  - Bundesamt für Eich- und Vermessungswesen, BEV, Vienna
  - Institut für Isotopenforschung und Kernphysik, Vienna
- ***Belgium***
  - Institute for Reference Materials and Measurements, IRMM, Geel
  - SCK•CEN, Mol
- ***Brazil***
  - Laboratório Nacional de Metrologia das Radiações Ionizantes, LNMRI/IRD/CNEN, (SA1/SA2), Rio de Janeiro
- ***Croatia***
  - Laboratory for Measurements of Low-level Radioactivity, RBI Zagreb
- ***Czech Republic***
  - Czech Metrology Institute, CMI Prague
- ***Denmark***
  - National Institute of Radiation Protection, SIS Herlev
- ***France***
  - Laboratoire National Henri Becquerel, LNE-LNHB, Saclay
- ***Germany***
  - Physikalisch - Technische Bundesanstalt, PTB, Braunschweig
- ***India***
  - Bhabha Atomic Research Centre, BARC, (SA1/SA2), Mumbai
- ***Japan***
  - National Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology, NMIJ/AIST Tsukuba

- ***Poland***
  - Laboratory of Radioactive Standards, RC POLATOM, Otwock-Swierk
- ***Romania***
  - Institutul National de Fizica si Inginerie Nucleara, IFIN-HH, (SA1/SA2), Bucharest
- ***Russia***
  - D.I. Mendeleyev Institute for Metrology, VNIIM, St. Petersburg
- ***Slovak Republic***
  - Slovak Institute of Metrology, SMU, Bratislava
- ***Slovenia***
  - Laboratory for Radiological Measurement Systems and Radioactivity Measurements, JSI, Ljubljana
- ***Spain***
  - Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT Madrid
- ***South Africa***
  - CSIR-National Metrology Laboratory, Cape Town
- ***Switzerland***
  - Institut universitaire de Radiophysique Appliquée, IRA/METAS, (SA1/SA2), Lausanne
- ***Taiwan***
  - Institute of Nuclear Energy Research, NRSL/INER Longtan
- ***United Kingdom***
  - National Physical Laboratory, NPL 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.
- Please note that only files on "Word" format will be accepted.

## Contribution Format

| | |
|---|---|
| LABORATORY | Name of laboratory |
| NAMES | If more than one laboratory is involved, identify affiliation through abbreviations (ORNL, LASL, etc.).<br>Visitors can also be identified with asterisks. |
| KEYWORDS | Alpha spectrometry, beta spectrometry, calorimetry, (anti) coincidence method, cryogenic detector, data evaluation, data measurement, Euromet, gamma-ray spectrometry, gas proportional counter, ionisation chamber, life sciences, liquid scintillation, low-level, NaI well counter, neutron measurement, radioactive gas, radiochemistry, simulation code, SIR, source preparation, X-ray spectrometry, radionuclide by name (e.g. 55Fe or Fe-55). Choose the good ones |
| APPARATUS<br>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. |

# General information on 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 38 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:

| | |
|---|---|
| President | Yoshio Hino [1] |
| Vice-President | Matjaz Korun[2] |
| | Guy Ratel[3] |
| | Carlos José da Silva[4] |
| Secretary | Pierino De Felice[5] |
| Past-President | Mike Woods [6] |

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 | Bruce Simpson [7] |
| Members | Maria Sahagia [8] |
| | Herbert Janβen [9] |

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 most recent series of ICRM meetings was at the 16$^{th}$ International Conference on Radionuclide Metrology and its Applications (ICRM 2007), which took place on 3 - 7 September 2007 at the Arabella Sheraton Grand Hotel in Cape Town, South Africa. The local organization was undertaken by the National Metrology Institute of South Africa (NMISA) in partnership with the iThemba Laboratory for Accelerator Based Sciences located near Cape Town.

Our appreciation and thanks go to all who contributed to this very successful and busy meeting. In particular we recognize the great contributions made by Dr. Bruce Simpson and his local organizing team, the Scientific Programme Committee, the referees and session chairmen and to the authors of papers.

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) Radionuclide Metrology Techniques | http://users.skynet.be/icrmrmt/ |
| John Keightley [10] | <John.Keightley@npl.co.uk>, |
| Mike Unterweger [11] | <michael.unterweger@nist.gov> |
| (2) Life Sciences | |
| Jeffery T. Cessna [11] | <jeffrey.cessna@nist.gov> |
| (3) Alpha-Particle Spectrometry | http://www.ciemat.es/sweb/metrologia/Alpha.html |
| Eduardo Garcia-Torano[12] | <E.garciatorano@ciemat.es> |
| (4) Gamma-Ray Spectrometry | http://www.nucleide.org/ICRM_GSWG.htm |
| Marie-Christine Lépy[13] | <marie-christine.lepy@cea.fr> |
| (5) Liquid Scintillation Techniques | http://www.nucleide.org/icrm.htm |
| Brian Zimmerman [11] | <bez@nist.gov> |
| (6) Low-Level Measurement Techniques | |
| Dirk Arnold [9] | <dirk.arnold@ptb.de> |
| (7) Non-Neutron Nuclear Data | |
| Marie-Martine Bé [13] | <mmbe@cea.fr> |

We all thank above co-ordinators and also special thank Dr. Alan Nichols[14,] Dr. Brian Zimmerman[11] and Dr. Philippe Cassette[13] for their great contributions as the chair of Non-Neutron Nuclear Data, Life Sciences and Liquid Scintillation Techniques until the last 16th ICRM meeting, respectively.

The next 17th international conference of ICRM 2009 will be held in May or June 2009 in Bratislava, Slovakia organized by the Slovak Institute of Metrology (SMU). This conference will include oral and poster presentations and business meetings of the ICRM Working Groups, in plenary format. More detailed information will be announced soon.

In addition to these plenary meetings, the Low-Level Measurement Techniques WG will have a meeting of ICRM-LLRT'08 on September 22 - 26 in Braunschweig(PTB), Germany. The first announcement is included in this Newsletter, and you may contact directly by e-mail to <ICRM-LLRMT@ptb.de>. Anyone wishing to participate in these ICRM's activities or to receive further information is encouraged to contact one of the officers or Working Group co-ordinators, and also to visit the ICRM homepage "http://physics.nist.gov/icrm".

Finally, we express our heartfelt thanks to Dr. Marie-Martine Bé for compiling and upload this ICRM Newsletter, and also thanks to Dr. Lisa Karam[11] for maintaining our ICRM homepage.

January 2008

Yoshio HINO
President of ICRM

**References**


1. National Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology (NMIJ/AIST), 1-1-1, Umezono, Tsukuba, Ibaraki 305-8568, Japan.
2. Jožef Stefan Institute (JSI), Jamova 39, Ljubljana, Slovenia.
3. Bureau International des Poids et Mesures, Pavillon de Breteuil (BIPM), F-92312 Sèvres CEDEX, France.
4. Instituto de Radioproteção e Dosimetria**,** Laboratório Nacional de Metrologia das Radiações Ionizantes (LNMRI), Av. Salvador Allende, 22780-160 Rio de Janeiro, Brazil.
5. Ente per le Nuove tecnologie, l'Energia e l'Ambiente (ENEA), C.R. Casaccia, P.O. Box 2400, I-00100 Rome, Italy.
6. Ionizing Radiation Metrology Consultants Ltd, 152 Broom Road, Teddington, Middlesex TWll 9PQ, U.K.
7. National Metrology Institute of South Africa (NMISA), 15 Lower Hope Road, Rosebank 7700, Cape Town, South Africa.
8. National Institute of C&D for Physics and Nuclear Engineering (IFIN), P.O. Box MG-6, RO-76900 Bucharest, Romania.
9. Physikalisch-Technische Bundesanstalt (PTB), Bundesalle 100, D-38116 Braunschweig, Germany.
10. National Physical Laboratory (NPL), Hampton Road, Teddington, Middlesex, TW11 0LW, UK.
11. National Institute of Standards and Technology (NIST), Gaithersburg, Maryland, 20899-8462, U.S.A.
12. Metrología de Radiaciones Ionizantes, Centro de Investigaciones Energéticas, Medioambientalesy Tecnológicas (CIEMAT), Avenida Complutense 22, E-28040 Madrid, Spain.
13. Laboratoire National Henri Becquerel (LNE-LNHB), CEA-Saclay, F-91191 Gif sur Yvette cedex, France.
14. International Atomic Energy Agency (IAEA), Wagramerstrasse 5, A-1400 Vienna, Austria.

## Conference Secretariat
(registrations, fees, accommodation)

Mrs. Johanne Schroven
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## Scientific Secretariat
(abstracts, manuscripts, proceedings)

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## Deadlines and Dates

| | |
|---|---|
| 2008-Feb-15 | Submission of pre-registration form to receive 2nd announcement |
| 2008-Mar-01 | Second announcement and call for abstracts |
| 2008-Apr-15 | Deadline for submission of abstracts |
| 2008-May-15 | Notification of acceptance of abstracts |
| 2008-Jul-15 | Deadline for early registration |
| 2008-Sep-01 | Deadline for conference registration and submission of accepted papers |
| 2008-Sep-22 | Start of conference |
| 2008-Sep-26 | End of conference |
| 2008-Dec-01 | Submission of final version of papers |

## Pre-Registration Form

In order to receive the next announcement, please complete and send back this form to the Conference Secretariat by February 15, 2008.

Last name: .....

First name: .....

Title: .....

Organisation: .....

.....

Address: .....

.....

.....

.....

Country: .....

Telephone: .....

Telefax: .....

E-mail: .....

I intend to submit a paper: ❑ yes ❑ no

Topic: .....

.....

Accompanying person(s): ❑ yes ❑ no

# ICRM

PTB

FIRST ANNOUNCEMENT
AND CALL FOR PAPERS

# 5th International Conference on Radionuclide Metrology Low-Level Radioactivity Measurement Techniques

# ICRM-LLRMT'08

## September 22 – 26, 2008

## Braunschweig
## Germany

Sponsored by
Physikalisch-Technische Bundesanstalt (PTB)
and
International Committee for Radionuclide Metrology (ICRM)

# ICRM-LLRMT'08

## Conference Description

The Low Level Techniques Working Group of the International Committee for Radionuclide Metrology is pleased to announce that its next conference will be held at the Physikalisch-Technische Bundesanstalt (PTB) in Braunschweig, Germany, September 22-26, 2008.

The measurement of low levels of radioactivity in a wide variety of matrices has been of interest to the scientific community since the beginning of the 'nuclear age' and techniques have always been developed to enable the detection of ever lower amounts of radioactivity in smaller samples and for many new applications. This conference will look at the latest developments in this area.

## Conference topics

- **Radiochemical Techniques**
  Fission Products, Actinides, Activation Products, Long Lived Radionuclides, Rapid Methods
- **Applications**
  NORM, TENR, Decommissioning, Bioassay, Food Safety, Safeguards, Remediation, Emergency Response, Forensic, Waste Management, Support Measurements for Astroparticle Physics, etc.
- **Radiometrics**
  α-Particle Spectrometry, Liquid Scintillation Counting, 'Conventional' and Ultra Low-Level γ-Ray Spectrometry, Other Radiometric Techniques
- **Non-radiometric measurements**
  Mass Spectrometry – ICP, Thermal Ionisation, Accelerator Based
- **Radon**
  Rn-Isotopes and their Decay Products
- **Quality**
  Traceability, Reference Materials, Proficiency Tests, Intercomparisons, Quality Assurance

## Conference Venue

Physikalisch-Technische Bundesanstalt
Bundesallee 100
D-38116 Braunschweig, Germany

## Conference web page

http://www.ptb.de/ICRM-LLRMT/

## Conference Language

The official language of the conference is English. All abstracts and presentations must be in English.

## Participation

All those interested in participating in the conference are asked to return the overleaf Pre-Registration Form, duly completed as soon as possible to the Conference Secretariat by February 15, 2008.

## Call for Papers

Contributed papers on the topics listed above are welcome. Authors wishing to submit a paper should send an Abstract to the Scientific Secretariat by April 15, 2008.

The abstracts should be sufficiently detailed and informative to allow the Scientific Committee to judge the scientific merit of the papers and their suitability for the conference programme. An abstract submission form will be available soon at the conference web page and will be distributed with the second announcement.

Notification of acceptance will be sent to authors until May 15, 2008. Authors are requested to submit the final text of accepted papers to the Scientific Secretariat by September 1, 2008. Authors should anticipate discussing their papers with the Scientific Committee during the conference, and making any editorial and/or technical modifications resulting from those discussions by December 1, 2008.

## Proceedings

It is planned to publish the conference proceedings in the journal APPLIED RADIATION AND ISOTOPES. Manuscripts must comply with guidelines which will be sent to the authors together with the information on acceptance of the paper. Acceptance of a paper for presentation at the conference does not automatically imply that it will be published in the proceedings. Publication of the manuscripts is subject to the result of a refereeing procedure.

## Scientific Committee

| | |
|---|---|
| Dirk Arnold | PTB Braunschweig, Germany |
| Pierino De Felice | ENEA Casaccia, Italy |
| Mikael Hult | EC-JRC-IRMM Geel, Belgium |
| Christian Hurtgen | SCK•CEN Mol, Belgium |
| Ken Inn | NIST Gaithersburg, USA |
| Simon Jerome | NPL Teddington, UK |
| Matthias Köhler | VKTA Dresden, Germany |
| Matjaz Korun | JSI Ljubljana, Slovenia |
| Matthias Laubenstein | LNGS-INFN Assergi, Italy |
| Marie-Christine Lépy | CEA-LNHB Saclay, France |
| Franz-Josef Maringer | BEV Vienna, Austria |
| Annette Röttger | PTB Braunschweig, Germany |
| Umberto Sansone | IAEA Seibersdorf, Austria |
| Herbert Wershofen | PTB Braunschweig, Germany |

## Registration Fees and Accomodations

Details will be available soon at the conference web page and will be distributed with the second announcement.

## Exhibition

A manufacturer's exhibition will be held during the conference. Potential exhibitors should contact the Conference Secretariat.

# ICRM

# CONTRIBUTIONS

# Report of the Liquid Scintillation Counting Working Group

Coordinator's report

The Liquid Scintillation Counting Working Group, created in 1997 held its first meeting during the ICRM'99 conference in Prague. Further meetings were organized in Saclay in November 2000 and during the ICRM conferences.

The aim of the Liquid Scintillation Counting (LSC) working group (WG) is to share information on the use of liquid scintillation 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 the developments of new instruments and methods in LSC. The topics of interest discussed during the previous WG meetings include:

- Ionisation 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 and the TDCR methods,
- Source stability studies,
- 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…

A comparison of the calculated absorbed spectra for the interaction of the 835 keV photons of $^{54}$Mn in a liquid scintillator was organised in 2004. The aim of this action was 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. Nine laboratories participated in this exercise and a total of 12 calculation codes were used. The results were presented and discussed during the ICRM2005 conference in Oxford (Comparison of calculated spectra for the interaction of photons in a liquid scintillator. Example of $^{54}$Mn 835 keV emission. Applied Radiation and Isotopes. Vol. 64, 10-11. *Pages 1471-1480*)

The intermediate meeting organized in Paris in January 2007 was attended by 25 participants, mostly from national metrology institutes. The following subjects were discussed:

- design of a TDCR counter (including optical chamber, coincidence unit and scalers),
- influence of the asymmetry of the photomultiplier tubes,
- behaviour of the counter when efficiency is changed,
- statistics of light emission,
- new photodetectors,
- new software,
- LS spectrometry,
- Measurement of mixture of pure-beta emitters,
- Standardization of various radionuclides: $^{55}$Fe, $^{63}$Ni, $^{209}$Po, $^{210}$Po…
- Measurement of the half-life of long-lived isotopes: $^{40}$K, $^{87}$Rb,$^{10}$Be, $^{41}$Ca, $^{79}$Se, $^{233}$U, $^{147}$Sm, $^{176}$Lu…
- LS cocktails chemistry effects,
- Study and characterisation of locally developed scintillators.

It is not intended to publish proceedings of this meeting but the presentations files are compiled in a CD ROM, distributed to the participants and available to the ICRM community, upon request to the coordinator.

Three future actions of the working group are planned:

- Compilation of LS sources preparation procedures used in metrology laboratories, from a questionnaire sent to the working group members. This action will be will coordinated by J. Cessna (NIST)
- A comparison of the influence of the asymmetry of a TDCR counter on the detection efficiency of low-energy radionuclides. The LSC WG coordinator will collect measurement data from various laboratories and will send them for analysis to laboratories wishing to participate in this exercise.
- A comparison of data analysis techniques for the TDCR method. A set of data will be sent to participating laboratories for analysis using their established programmes and methodologies in the hopes of gaining knowledge about uncertainty assessment using TDCR. The results will be presented at the upcoming CCRI(II) Uncertainties Workshop in September.

No specific intercomparison measurement was proposed but the working group reaffirmed its interest in an international measurement comparison of tritiated water.

The business meeting of the LSC working group was held in Cape Town in September 2007. After a short report on the working group intermediate meeting, participants exposed their ongoing work in LSC: optics of a TDCR counter (including the use of design software), status of TDCR projects and problems in the standardization of $^{241}$Pu.

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 (http://www.nucleide.org/icrm.htm) and is also accessible from the main ICRM web page. Participant contributions are welcome and must be sent to the coordinator.

After 10 years of coordination of this working group I decided to take a back seat but I still wish to be active in the group. I am very pleased that Brian Zimmerman accepted to be the new coordinator of the LSC WG and that he was officially elected by the ICRM general meeting in Cape Town.

Philippe Cassette, past coordinator,
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Tel : 33 1 69 08 48 68
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## Coordinator's Report

## ICRM Life Sciences Working Group

During 2007, two meetings of the Life Sciences Working Group (LSWG) were held. The first of these took place at the headquarters of the Laboratoire national de métrologie et d'essais (LNE) in Paris 10-11 January 2007, immediately following the meeting of the Liquid Scintillation Working Group. The meeting was attended by 13 participants from 11 institutions. The format consisted of a number of presentations from each laboratory, followed by a discussion period. The topics covered during the meeting included:

- Radionuclide metrology in the non-medical life sciences;
- Quality Assurance, standards, and metrology;
- Inter-laboratory comparisons;
- Needs for new radioactivity standards in radiation medicine; and
- Radionuclide calibrators, Monte Carlo techniques.

Specific action items those arose from the meeting were:

- Stress the need for $^{3}H$ (tritiated water) CCRI(II) Key Comparison to be conducted as soon as possible (Status: comparison will be piloted by LNHB, and is expected to take place in mid-2008),
- Propose $^{177}Lu$ as CCRI(II) Key Comparison for 2008 (Status: approved as CCRI(II) Key Comparison to be piloted by NIST; originally scheduled for early 2008, comparison has been postponed in order to conduct $^{3}H$ comparison);
- Other comparisons to be proposed: $^{85}Kr$, $^{99m}Tc$ (to be conducted as CCRI(II) Key Comparison using BIPM traveling standard), assay of $^{90}Sr$ impurity in $^{90}Y$ (Status: $^{99m}Tc$ comparison could start as early as Nov. 2008; all other comparisons on hold until $^{3}H$ and $^{177}Lu$ comparisons are completed).
- Begin work on collecting activity calibrator factors for medical radionuclides in different ionization chambers and different containers.

A CD of the presentations was prepared and is available from the ICRM Secretary. It is also planned to post the presentations on the LSWG web site.

The second meeting of the LSWG was held on 6 September 2008 in Cape Town, South Africa as part of the biennial ICRM general meeting. Due to time constraints, the only topics presented were an update of the January LSWG meeting in Paris and a short update on the status of the BIPM travelling NaI(Tl) standard and associated $^{99m}Tc$ comparison.

During the General Meeting of the ICRM on 7 September 2008, the continuation of the LSWG was confirmed and J. Cessna (NIST) was named Coordinator, following the resignation of the current Coordinator.

B. E. Zimmerman, Coordinator

National Institute of Standards and Technology
100 Bureau Dr., Stop 8462
Gaithersburg, MD 20899-8462
USA

## Report on the Activities of the Low-Level Measurement Techniques Working Group

In the period since the last report (i.e. from 1st January 2007-31st December 2007) the main activities of the LLMT-WG have been to facilitate the Low-Level Measurements session of the ICRM 2007 conference in Cape Town. There were seven papers presented at the conference; these covered:

- Low-level ICPMS and AMS measurements of Uranium-isotopes
- Background sources in low-level underground γ-ray spectrometry
- Certified reference materials and intercomparisons
- Sampling and counting times for environmental γ-ray spectrometry
- Radiochemical Procedures to determine U and Th in soil samples
- Low-level γ-ray spectrometry systems and measurement results

The papers were reviewed by IRMM, JSI, NPL and PTB staff. A review of current activities was presented at the ICRM General meeting after the conference.

In the tradition of the LLMT-WG conferences in Monaco 1991, Seville 1995, Mol 1999 and Vienna 2003 the next conference on Low-Level Radioactivity Measurement Techniques will be held at the Physikalisch-Technische Bundesanstalt (PTB) in Braunschweig, Germany, September 22-26, 2008. Further information can be found on the conference web page: www.ptb.de/ICRM-LLRMT/ and in the attached first announcement.

Dirk Arnold
Physikalisch-Technische Bundesanstalt, Germany

# 2007 Report of the ICRM Gamma-Ray Spectrometry Working Group

The Gamma-Ray Spectrometry Working Group is devoted to the development of the metrological aspects of gamma-ray spectrometry and its applications. This includes, but is not restricted to: measurement techniques and equipment, determination of photon emission intensities, detector efficiency calibrations, coincidence-summing corrections, uncertainties, correlations, new instrumentation and X-ray spectrometry.
Two projects were proposed during ICRM 2005 WG meeting and are now standing. These projects were discussed during ICRM 2007 WG meeting in Cape Town.

## 1. Comparison of Monte Carlo codes for efficiency calibration

The Monte Carlo action is leaded by Tim Vidmar. The participants were asked to compute full energy peak and total efficiencies for three simple sample-germanium detector geometries, for a list of energies in the 45 keV to 3 MeV energy range. Eighteen laboratories are participating (28 people involved) in the action and six different Monte Carlo codes are used: five generalist codes (MCNP, GEANT, PENELOPE, EGS, TRIPOLI) and one specific code (GESPECOR). Contrarily to what was expected, rather scattered results were observed (except for geometry #1 – point source). However, relative quantities (e.g. ratios from geometry 3 to geometry 2) show less discrepant results. In a working group meeting held in late 2006, these *a priori* not satisfactory results were discussed and some clues were given to try to explain the differences (cross sections, efficiency definitions, size of the bins used, etc.). It was decided to perform further calculations, employing a well defined set of control parameters for each code and a precise definition of the full energy peak. It was also agreed that no variance reduction techniques should be applied in this second run of calculations. Tim Vidmar presented orally the whole results during the Gamma Spectrometry session of the 2007 ICRM Conference, entitled “An intercomparison of Monte Carlo codes used in gamma-ray spectrometry”.
The next step will compare the sets of cross sections used in the different codes to check whether this could explain the discrepancies.

## 2. GS WG Web site and forum

A web page dedicated to the Gamma Spectrometry WG is hosted by LNHB at the address: http://www.nucleide.org/ICRM_GSWG.htm.
In parallel, a link on the ICRM main site hosted by NIST was also created: (http://physics.nist.gov/Divisions/Div846/ICRM/working_groups.html#GSWG)
This should be the place to provide information about gamma-ray spectrometry technique. Relevant contributions are welcome.

In addition, a forum (address: http://laraweb.free.fr/GRS_forum/) has been created to facilitate exchanges among working group members. The purpose of this forum is to report on recent studies and results, discuss about in progress exercise or set out specific problems, etc. On January 2008, the forum had 49 registered members.

## 3. Further projects

### *3.1 Coincidence summing corrections*

This topic is of major interest for ICRM GSWG members and should start in 2008. Different methods (numerical computation, Monte Carlo simulation, empirical methods…) are used to compute the corrective factors and could be compared. The main difficulty of the exercise is to provide a coherent set of data as required by the different methods.

### *3.2 Comparison of efficiency curves fitting*

This action is proposed mainly to assess the reliability of uncertainties and the importance of covariances in the efficiency calibration curves.

### *3.3 Efficiency calibration in the low-energy range*

There is a requirement of measurements of emission intensities in the low-energy range. However, the accuracy of our efficiency calibration curves is rather poor in the 80-120 keV energy range mainly because of the change of the curvature in this region. Moreover, there are few available radionuclides for calibration and the relevant emission intensities have high uncertainties. This subject should be carefully examined and could induce further experimental measurements.

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**I.C.R.M.**
**INTERNATIONAL COMMITTEE FOR RADIONUCLIDE METROLOGY**
**a-PARTICLE SPECTROMETRY WORKING GROUP**

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# REPORT OF ACTIVITIES

**September 2005-September 2007**

The aim of this Working Group (WG) was described in the document "*WG Scope and Actions*", issued in 1993. Topics include detectors and measurement techniques, computer codes and algorithms and measurements of nuclear data related to alpha emission. This document, as well as other information of interest, can be found in the WG web side:

http://www2.ciemat.es/sweb/metrologia/Alpha.html

The only standing action is the EUROMET project #749, about alpha-particle emission probabilities and energies of the nuclide $^{240}$Pu. This project is coordinated by G. Sibbens (IRMM-JRC), with IRMM, CIEMAT, PTB, Univ. of Extremadura, CEA-LNHB and NPL acting as partners. Sources were prepared at IRMM and dispatched to participant laboratories. Measurements have been carried out at IRMM, CIEMAT and PTB for more than one year in order to obtain a set of spectra with the adequate statistical signification. All spectra have been sent to participants for analysis. A discussion of the preliminary results will be held at the next WG meeting.

A high-resolution alpha spectrometer, similar to those existing at IRMM, CIEMAT and NPL has been built at the University of Extremadura, to be used in future projects in the frame of this WG.

A business meeting of this WG was held in September 2007, in Cape Town, South Africa, in the frame of the ICRM'2007 conference. The main topic was the status of the EUROMET 749 project. The main problems found were highlighted by the project coordinator and the tasks to be carried out by participants were agreed.

## Non-Neutron Nuclear Data Working Group (3NDWG): Report, December 2007

Coordinator: A. Nichols till September 2007

New coordinator : M.-M. Bé

Key words: decay data; evaluations; nuclear decay data requirements

1. 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. 3NDWG members continue to be involved in the evaluation efforts of the Decay Data Evaluation Project (DDEP). Communications between decay data evaluators are encouraged through this project (co-ordinator: E. Browne, ebrowne@lbl.gov). Details of this work and the recommended decay data can be found on the Internet: http://www.nucleide.org/DDEP_WG/DDEPdata.htm

3. 3NDWG members continue to evaluate decay schemes for specific actinides and their decay products as part of an agreed programme of work for an IAEA Coordinated Research Project on "Updated decay data library for actinides" (2005-09) contact: M. A. Kellett (e-mail: m.kellett@iaea.org).

4. Noteworthy on-going work by 3NDWG members include the following:
   (a) issue of a new volume of Monographie BIPM-5 is planned for October 2008 to include both updated and completely new decay scheme evaluations (M.-M. Bé);
   (b) better definition of ß-decay shape factors – A specific action was proposed by P. Cassette, this was accepted by the General Meeting (7 September 2007) and P. Cassette has been agreed as coordinator of this sub-group.
   (c) forthcoming 3NDWG-based workshops include ICTP-IAEA-Workshop on Nuclear Structure and Decay Data: Theory and Evaluation, 28 April – 9 May 2008, Miramare, Trieste, Italy (see http://agenda.ictp.it/smr.php?1939), and DDEP training workshop to be organised by Aurelian Luca (IFIN) in Romania, 13-15 May 2008.

5. The work of the 3NDWG was re-endorsed at the 2007 ICRM General Meeting (7 September 2007, Cape Town, South Africa). Alan Nichols (IAEA) relinquished his role as coordinator of the 3NDWG at this meeting; new coordinator is Marie-Martine Bé (LNHB, CEA Saclay, France).

6. Further points of note:
   (a) request remains to re-measure the half-lives of U-235 and U-238 to high accuracy;
   (b) need to resolve anomalies between recent and on-going half-life measurements (particularly all relevant work of national standards laboratories: NIST, NPL, PTB, LNHB).

I would like to thank Alan Nichols for his great work as the coordinator of the working group. He has organised the Nuclear Data Session for many years, and I hope that the next conferences will continue to be fruitful in this field.
Marie-Martine Bé

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10 January 2008

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| LABORATORY | Ionizing Radiation Physics Group, Radiopharmaceutical Research Institute, Australian Nuclear Science & Technology Organisation (ANSTO) |
| NAMES | D Alexiev, L Mo, M Smith, L. Bignell |
| ACTIVITY | 1. Completed design and construction of automated (Labview driven) Au-198 wire activity measurement system for NTD Si neutron flux profiling.<br>2. Performed sipping tests on the fuel elements of ANSTO OPAL research reactor.<br>3. Participated in the Monte Carlo Codes Intercomparison exercise organized by the ICRM Gamma-Ray Spectrometry Working Group.<br>4. Standardization of I-123 using the TDCR method.<br>5. Monte Carlo simulation of liquid scintillation process using GEANT4.<br>6. Establish efficiency curve for HPGe detectors for point source.<br>7. Continue the annual traceability program for ARI for I-131, Ga-67, Tl-201, Tc-99m and Y-90 activity measurements. |
| PUBLICATIONS | 1. L. Mo, H.Y. Wu and C. Baldock. Absolute activity determination of Au-198 solid source using $4\pi\beta-\gamma$ coincidence counting corrected by Monte-Carlo calculation. IEEE transactions on Nuclear Science, vol 54, No 3, June 2007. |
| ADDRESS | New Illawarra Road<br>Lucas Heights NSW 2234, Australia |
| CONTACT | Li Mo, lmx@ansto.gov.au |

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| LABORATORIES | IAEA Nuclear Data Section, Vienna, Austria;<br>Serco Assurance, Winfrith Science Centre, Dorchester, UK |
| NAMES | AL Nichols, MA Kellett (IAEA) and RJ Perry (Serco Assurance) |
| ACTIVITY | Decay-data evaluations and preparation of databases |
| RESULTS/ INFORMATION | Decay-data evaluations underway in 2007-08:<br>(a) evaluations for DDEP: $^{97m}$Tc, $^{106}$Rh, $^{126}$Sb, $^{127}$Sb, $^{127}$Te, $^{127m}$Te, $^{132}$I, $^{144}$Pr, $^{208}$Tl, $^{201}$Pb, $^{212}$Pb, $^{212,215}$Bi, $^{212,216}$Po, $^{211,219}$At, $^{219,220}$Rn, $^{224}$Ra, $^{228}$Th and $^{242m}$Am;<br>(b) $^{192}$Au and $^{214}$Bi; (c) JEFF-3 evaluations for fusion. |
| IN PROGRESS | Evaluation of decay data for DDEP. |
| INFORMATION | Decay data evaluations completed in 2007 for the JEFF-3 library: $^{45m}$Sc, $^{70}$Ga, $^{71}$Ge, $^{71m}$Ge, $^{75}$Ge, $^{75m}$Ge, $^{79}$Se, $^{90}$Y, $^{90m}$Y, $^{90m}$Zr, $^{90}$Nb, $^{90m}$Nb, $^{90n}$Nb, $^{98}$Tc, $^{113}$Cd, $^{113m}$Cd, $^{121}$Sn, $^{121m}$Sn, $^{166}$Dy, $^{170}$Tm, $^{176m}$Yb, $^{184}$Re, $^{189m}$Os and $^{190}$Pt.<br>Completed for DDEP: $^{109}$Pd, $^{132}$Te, $^{242}$Am, $^{244}$Am and $^{244m}$Am. |
| PUBLICATIONS | M-M Bé, VP Chechev, R Dersch, OAM Helene, RG Helmer, M Herman, S Hlavác, A Marcinkowski, GL Molnár, AL Nichols, E Schönfeld, VR Vanin and MJ Woods, Update of X Ray and Gamma Ray Decay Data Standards for Detector Calibration and Other Applications, Vols 1 and 2, STI/PUB/1287, May 2007, IAEA, Vienna, Austria, ISBN 92-0-113606-4. Also available on the Web: http://www-nds.iaea.org/xgamma_standards/ |
| OTHER RELATED PUBLICATIONS | AL Nichols, Nuclear Decay Data: Observations and Reflections, *Appl. Radiat. Isot.* **64** (2006) 1384-1391.<br>The Aims and Activities of the International Network of Nuclear Structure and Decay Data Evaluators, AL Nichols and JK Tuli, Int. Conf. Nucl. Data for Sci. Technol., 22 – 27 April 2007, Nice, France.<br>IAEA Coordinated Research Project: Updated Decay Data Library for Actinides, MA Kellett, FG Kondev and AL Nichols, ICRM 2007, 3-7 Sept. 2007, Cape Town, South Africa; to be published in *Appl. Radiat. Isot.* |
| ADDRESS | IAEA Nuclear Data Section,<br>Department of Nuclear Sciences and Applications,<br>PO Box 100, Wagramerstrasse 5, A-1400 Vienna, Austria. |
| CONTACT | Dr Alan Nichols<br><br>A.L.Nichols@iaea.org |

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| LABORATORY | BEV – Bundesamt für Eich- und Vermessungswesen, AUSTRIA |
| NAMES | F:J. Maringer, R. Brettner-Messler, M. Kreuziger, P. Michai |
| ACTIVITY | Metrological and applied research<br>Participation in international comparison - EURAMET, CCRI(II) and bilateral comparisons<br>Routine certification (medical activity meter, surface contamination monitors)<br>Calibration services |
| KEYWORDS | National Metrology Institute<br>Radioactivity laboratory with low-level facilities<br>Calibrated $4\pi\gamma$ ionisation chambers<br>HPGe detectors for gamma spectroscopy<br>Low-level anti-compton HPGe gamma spectrometer<br>Multiwire proportional chamber<br>Radon ionisation chambers |
| RESULTS | CCRI(II)-K2.I-125<br>CCRI(II)-K3.I-131<br>CCRI(II)-K2.Co-60<br>National comparison in radon activity concentration in air<br>National comparison in gamma spectrometry / activity concentration in aqueous solutions<br>Monte Carlo calculations of ISOCAL IV ionisation chamber response to gamma and beta emitters |
| PUBLICATIONS | D. Kryeziu, M. Tschurlovits, M. Kreuziger and F-J. Maringer (2007): Calculation of calibration figures and the volume correction factors for 90Y, 125I, 131I, and 177Lu radionuclides based on Monte – Carlo ionisation chamber simulation method. Nuc. Instr. Meth. A. Elsevier B.V., North-Holland. ISSN: 0168-9002. (accepted, in press, online available)<br>Röttger, A., Honig, A., Schmidt, V., Buchröder, H., Rox, A., Butterweck, G., Schuler, Ch., Maringer, F.J., Jachs, P., Edelmaier, R., Michielsen, N., Howarth, C.B., Miles, J.C. H., Vargas, A., Ortega, X., Burian, I., Turtiainen, T., Hagberg, N., (2006): Radon activity concentration – a Euromet and BIPM supplementary comparison. APPL RADIAT ISOTOPES, 64, 1102-1107; ISSN 0969-8043.<br>Röttger, A., Honig, A., Butterweck, G., Schuler, Ch., Schmidt, V., Buchröder, H., Rox, A., Miles, J.C.H., Burian, I., Michielsen, N., Voisin, V., Maringer, F.J., Vargas, A., (2005): Intercomparison exercise of calibration facilities for radon gas activity concentration. RADIO in the ENVIRON, 7, 306-313; ISSN 1569-4860.<br>Baumgartner A., Witzani J., Steurer A., Leitner A., Maringer F.J. (2007): Energy Range and Application Enhancement of the BEV Graphite |

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| | Calorimeter: First Assignments and Preliminary Results. Proc. Absorbed Dose and Air Kerma Primary Standards Workshop, Paris 2007.<br><br>Baumgartner, A., Maringer, F.J., Michai, P., Kreuziger, M. (2006): Result of the intercomparison exercise on radon measuring instruments and radon detectors 'BEV-Radonring 2005'. In: European International Radiation Protection Association (Hrsg./Eds.), Second European IRPA congress on radiation protection, 15. - 19. Mai 2006, Paris, 1-6.<br><br>Brettner-Messler, R., Maringer, F.J., (2006): Results of Monte Carlo calibrations of a low energy germanium detector. In: European International Radiation Protection Association (Hrsg./Eds.), Second European IRPA Congress on Radiation Protection, 15. - 19. Mai 2006, Paris, 1-7.<br><br>Kryeziu, D., Kreuziger, M., Tschurlovits, M., Maringer, F.J., (2006): Simulation of the energy response of the ISOCAL IV pressurised re-entrant well type ionization chamber using the PENELOPE Monte-Carlo code. In: European International Radiation Protection Association (Hrsg./ Eds.), Second European IRPA congress on radiation protection, 15.-19. Mai 2006, Paris, 1-8.<br><br>Maringer, F.J. (2006): Radonmessung in Österreich: Standards, Kalibrierung, Messunsicherheiten und Qualitätsmanagement. In: Fachverband für Strahlenschutz e.V. / E. Ettenhuber, R. Giessing, E. Beier, A. Bayer, 38. Jahrestagung des Fachverbandes für Strahlenschutz e.V., 18. - 22. September 2006, Dresden, Publikationsreihe Fortschritte im Strahlenschutz, FS-06-141-T, 415-422; ISSN 1013-4506.<br><br>Gruber, V., Maringer, F.J., Katzlberger, C., Kaineder, H., Brettner-Messler, R., (2005): Survey of radioactivity in drinking water in Upper Austria by LSC and gammaspectroscopy. In: LSC2005, Advances in Liquid Scintillation Spectrometry, 17. - 21. Oktober 2005, Katowice, 1-5.<br><br>Maringer, F.J., Leitner, A., Tschurlovits, M., (2005): Radiation protection metrology in Austria: Status and needs in a European perspective. In: Verica Garaj-Vrhovac(Hrsg./Eds.), Nevenka Kopjar (Hrsg./Eds.), Saveta Miljanic (Hrsg./Eds.), 6$^{th}$ Symposium of the Croatian radiation protection association, 18. - 20. April 2005, Zagreb, 28-33; ISBN: 953-96133-5-3.<br><br>Schönhofer, F., Maringer, F.J., (2005): The EU drinking water directive, the Austrian standard and an ultra low - level liquid scintillation spectrometry approach for assuring compliance. In: LSC 2005 (Hrsg./Eds.), Advances in liquid Scintillation Spectrometry, 17. - 21. Oktober 2005, Katowice, 1-14. |
| IN PROGRESS | Development of a primary standard for surface emission rate (large area sources)<br><br>2 thesis in radioactivity in progress |
| INFORMATION | 82 CMC‘s in radioactivity measurements |
| SOURCE IN PREPARATION | Planned participation (2008, 2009) in CCRI(II).K for Cs-134, Lu-177, Pb-210 |
| OTHER RELATED PUBLICATIONS | Hrachowitz, M., F.-J. Maringer and M. Gerzabek (2005): Estimation of soil redistribution rates with the 137Cs-tracer method: Approach to a new conversion model. Geophysical Research Abstracts, 7, 10868,1-3.<br><br>Hrachowitz, M., Maringer, F.J., Steineder, C., Gerzabek, M.H., (2005): Soil redistribution model for undisturbed and cultivated sites based on Chernobyl - derived Cesium-137 fallout. J ENVIRON QUAL, 34, 1302-1310; ISSN 0047- |

2425.

Maringer, F.J., Schillfahrt, P., Auer, T., Pecina, R., (2005): A new Austrian recommendation guide for radon prevention in the design and construction of new buildings in areas with highly elevated radon levels. RADIO in the ENVIRON, 7, 772-778; ISSN 1569-4860.

Ringer, W., Kaineder, H., Maringer, F.J., Kindl, P., (2005): Determination of the radon potential of a building by a controlled depressurisation technique. RADIO in the ENVIRON, 7, 221-231; ISSN 1569-4860.

Szerbin, P., Juhasz, L., Csige, I., Varhegyi, A., Vincze, J., Szabo, T., Maringer, F.J., (2005): Remediation case study of a coal fired power plant tailings pond. RADIO in the ENVIRON, 7, 1071-1080; ISSN 1569-4860.

Gruber, V., Maringer, F.J., Kaineder, H., Brettner-Messler, R., Sperker, S., (2006): A survey of radioactivity in drinking water in upper Austria. In: European International Radiation Protection Association (Hrsg. / Eds.), Second European IRPA Congress on Radiation Protection, 15.-19. Mai 2006, Paris, 1-6.

Seidel, C., Maringer, F.J., Bossew, P., (2006): A comprehensive evaluation of health effects in Europe - two decades after Chernobyl. In: European International Radiation Protection Association (Hrsg./Eds.), Second European IRPA congress on radiation protection, 15. - 19. Mai 2006, Paris, 1-6.

Hrachowitz, M.,Maringer, F.-J., Gerzabek, M.H. (2005): Radioisotopes in the Danube. In: O. Uhlmann, G.J. Annokkée, F. Arendt: 9th International FZK/TNO Conference on Soil-Water Systems, 3-7 October 2005, Bordeaux; Proceedings, 2943-2944.

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# Summary of the research program related to radionuclide metrology for the years 2007 and 2008

within the Research Groups "Isotopenforschung" (Isotope Research) and "Kernphysik" (Nuclear Physics) of the Faculty of Physics at the University of Vienna, Austria
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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]*

Some activities of the two research groups concentrate on the improvement and development of atomic and nuclear measuring techniques and data handling procedures for basic physics and 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 is also provided via the home page given above.

Names: F. Dellinger, R. Drosg, F. Eder, O. Forstner , E. Friedl, H. Friedmann, R. Golser, J. Gröller, P. Hille, D. Imrich, J. Kühtreiber, W. Kutschera, C. Lederer, St. Lehr, J. Lukas, M. Martschini, K. Melber, Ph. Müllner, E. Pak, A. Pavlik, A. Priller, F. Quinto, L. Reichart, K. Rumpelmayr, G. Schätzel, P. Steier, B. Strohmaier, S. Tagesen, H. Vonach, A. Wallner, F. Weninger, E. Wild, G. Winkler

Facilities, projects, tasks:

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

   For details on the experimental equipment see:
   http://www.univie.ac.at/Kernphysik/VERA/welcome.htm .
   Accelerator mass spectrometry (AMS) injecting negative ions into a tandem accelerator and stripping them to positive ions is a major tool for research. With AMS radionuclides are measured by direct atom counting; selectivity is achieved employing energy-, momentum- and velocity-selecting devices (electrostatic, magnetic, velocity and time-of-flight 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 $^{14}C$ ($5.7\times10^3$ 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, e.g., for applications in geology, atmospheric and climate research, in particular employing $^{26}Al/^{10}Be$ ratios], heavy long-lived radionuclides such as $^{129}I$ ($T_{1/2}\approx 1.6\times10^7$ a), $^{236}U$ ($T_{1/2}\approx 23\times10^6$ a) [in natural and anthropogenic environmental samples), $^{239}Pu$ ($2.4\times10^4$a) [together with $^{236}U$ in uranium

ores], $^{244}$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) [of interest in astrophysics and geophysics, requiring new isobar separation methods] are counted in natural samples with an excellent suppression of isobaric background. Recently, AMS studies with $^{41}$Ca and $^{55}$Fe atoms were performed. For recent work, see:

AMS MEASUREMENTS OF $^{41}$Ca and $^{55}$Fe at VERA – TWO RADIONUCLIDES OF ASTROPHYSICAL INTEREST, A. Wallner, M. Bichler, I. Dillmann, R. Golser, F. Käppeler, W. Kutschera, M. Paul, A. Priller, P. Steier, C. Vockenhuber; Nuclear Instruments and Methods **B 259** (2007) 677-682.

DEVELOPMENT OF ISOBAR SEPARATION FOR $^{182}$Hf AMS MEASUREMENTS OF ASTROPHYSICAL INTEREST, C. Vockenhuber, A. Bergmaier, T. Faestermann, K. Knie, G. Korschinek, W. Kutschera, G. Rugel, P. Steier, K. Vorderwinkler, A. Wallner; Nuclear Instruments and Methods **B 259** (2007) 250-255.

MEASUREMENT OF $^{26}$Al FOR ATMOSPHERIC AND CLIMATE RESEARCH AND THE POTENTIAL OF $^{26}$Al/$^{10}$Be RATIOS, M. Auer, W. Kutschera, A. Priller, D. Wagenbach, A. Wallner, E.M. Wild; Nuclear Instruments and Methods **B 259** (2007) 595-599

AMS OF NATURAL $^{236}$U AND $^{239}$Pu PRODUCED IN URANIUM ORES, K.M. Wilcken, T.T. Barrows, L.K. Fifield, S.G. Tims, P. Steier; Nuclear Instruments and Methods **B 259** (2007) 727-732

DEVELOPMENT TOWARDS THE MEASUREMENT OF I-129 IN LIGNITE, G. Wallner, P. Steier, Th. Brandl, M.E. Friesacher, P. Hille, W. Kutschera, M. Tatzber, Sh. Ayromlou; Nuclear Instruments and Methods **B 259** (2007) 714-720

A COMBINED METHOD FOR THE DETERMINATION OF THE ISOTOPIC VECTOR OF PLUTONIUM ISOTOPES IN ENVIRONMENTAL SAMPLES, E. Hrnecek, R. Jakopic, A. Wallner, P. Steier; Journal of Radioanalytical and Nuclear Chemistry, Vol. 276, No.3 (2008) 789–793

DISENTANGLING GEOMAGNETIC AND PRECIPITATION SIGNALS IN AN 80-KYR CHINESE LOESS RECORD OF $^{10}$Be; W. Zhou, A. Priller, J. W. Beck, Z. Wu, M. Chen, Z. An, W. Kutschera, F. Xian, H. Yu, L.Liu; Radiocarbon **49/1** (2007) 139 – 160

NATURAL AND ANTHROPOGENIC $^{236}$U IN ENVIRONMENTAL SAMPLES, Peter Steier, Max Bichler, L. Keith Fifield, Robin Golser, Walter Kutschera, Alfred Priller, Francesca Quinto, Stephan Richter, Michaela Srncik, Philippo Terrasi, Lukas Wacker, Anton Wallner, Gabriele Wallner, Klaus M. Wilcken, Eva Maria Wild; submitted to Proceedings of the 9$^{th}$ International Conference on the Application of Accelerators in Research and Technology, Florence, Italy, September 3-7, 2007. To be published in Nucl. Instr. and Meth. in Phys Res. B

Recent projects involving radiocarbon measurements are, e.g.,

- radiocarbon determination of particulate organic carbon for dating of (e.g. Alpine glacier) ice requiring the development of techniques to treat very small samples: TREATMENT OF SMALL SAMPLES OF PARTICULATE ORGANIC CARBON (POC) FOR RADIOCARBON DATING OF ICE, R. Drosg, W. Kutschera, K. Scholz, P. Steier, D. Wagenbach, E. M. Wild; Nuclear Instruments and Methods **B 259** (2007) 340-344

- RADIOCARBON DATING OF THE PERUVIAN CHACHAPOYA/INKA SITE AT THE LAGUNA DE LOS CONDORES, E. M. Wild, S. Guillen, W. Kutschera, H. Seidler, P. Steier; Nuclear Instruments and Methods **B 259** (2007) 378-383

New methods for isobar suppression in the injected ion beam (ion source) are studied using lasers:

ISOBAR SUPPRESSION IN AMS USING LASER PHOTODETACHMENT, Oliver Forstner, Pontus Andersson, Christoph Diehl, Robin Golser, Dag Hanstorp, Walter Kutschera, Anton Lindahl, Alfred Priller, Peter Steier, Anton Wallner; submitted as Proceedings of the XV$^{th}$ International Conference on

Electromagnetic Isotope Separators and Techniques Related to their Applications, Deauville, France, June 24-29, 2007. Nucl. Instr. and Meth. in Phys. Res. B

The existence of exotic negative molecules was also studied via AMS:

EXOTIC NEGATIVE MOLECULES IN AMS, R. Golser, H. Gnaser, W. Kutschera, A. Priller, P. Steier, A. Wallner; Nuclear Instruments and Methods **B 259** (2007) 71-75

2. Other recent radionuclide measurements and evaluation methods

a) A further improved value of the *half-life of $^{44}Ti$* was obtained from a 14-years long decay measurement relative to the half-life of $^{60}$Co (assumed to be 5.2711 ± 0.0004 a), *that is 58.9 ± 0.3 years.*
IMPROVED MEASUREMENT OF THE $^{44}$Ti HALF-LIFE FROM A 14-YEAR LONG STUDY, I. Ahmad, J.P. Greene, E.F. Moore, S. Ghelberg, A. Ofan, M. Paul, W. Kutschera; Physical Review **C 74** (2006) 065803

b) *The half-life of $^{183}Hf$* was re-measured with high precision after it had been produced by the (n, γ) reaction on the long-lived *$^{182}Hf$ [half-life (8.90 ± 0.09) ´ $10^6$ a)]* giving the value *1.018 ± 0.002 hours.*
HALF-LIFE OF $^{183}$Hf, C. Vockenhuber, M. Bichler, W. Kutschera, A. Wallner, I. Dillmann, F. Käppeler; Phys. Rev. **C 74** (2006) 057303-1 to 057303-3

c) As a follow-up program of the *Austrian National Radon Project (ÖNRAP)* (http://www.univie.ac.at/Kernphysik/oenrap/onrap_e.htm) [H. Friedmann] correlations between the so-called radon potential and details of the geology are to be investigated.

d) THE PRINCIPLE OF THE BAYESIAN METHOD, F.Weninger, P. Steier, W. Kutschera, E. M. Wild; Agypt and the Levant – Int. Journal for Egyptian Archaeology and Related Disciplines (2007) 317-324

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

Co-operation with the *Austrian Standards Institute* (OENORM) [related to low-level measurements and harmonisation of uncertainty statements] is continued.

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.

4. Participation in international organisations dealing with radionuclide metrology

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

February 2008 Gerhard Winkler

| | |
|---|---|
| LABORATORY | European Commission - Joint Research Centre<br>Institute for Reference Materials and Measurements (IRMM)<br>Radionuclide Metrology Sector |
| NAMES | Stefaan Pommé, Goedele Sibbens, Timotheos Altzitzoglou, Raf Van Ammel, Jan Paepen, Johan Camps, Uwe Wätjen |
| APPARATUS ACTIVITY | * radioactive source preparation (quantitative drop deposition, IRMM source drying device, vacuum evaporation and electrodeposition)<br>* $4\pi$ pressurised gas proportional counter<br>* windowless $4\pi$CsI(Tl)-sandwich spectrometer<br>* two $\alpha$-particle counters at defined solid angle<br>* atmospheric $4\pi\beta-\gamma$ coincidence counter<br>* pressurised $4\pi\beta-\gamma$ coincidence counter<br>* $4\pi\gamma$ NaI well counter<br>* two secondary standard ionisation chambers and one prototype IC<br>* two 4p liquid scintillation counters<br>* X-ray counter at defined solid angle<br>* HPGe detector<br>* Si(Li) X-ray detector spectrometer<br>* two high resolution semiconductor alpha-particle spectrometers |
| RESULTS | * Production of an IRMM source drying device.<br>* U. Wätjen, Zs. Szántó, T. Altzitzoglou, G. Sibbens, J. Keightley, R. Van Ammel, M. Hult and M. De Cort, Evaluation of EC measurement comparison on simulated airborne particulates - $^{137}$Cs in air filters, Report EUR 22926 EN (2007), ISBN 978-92-79-06962-8.<br>* J. Paepen, A. Švec, J. Camps, R. Van Ammel, S. Pommé, U. Wätjen, Prototype of a radiation source for calibration of installed radiation monitors, Proc. of IRPA Regional Congres for Central and Eastern Europe, Brasov, Romania, 24-28 Sept. 2007. |

PUBLICATIONS

* S. Pommé, J. Keightley, Count rate estimation of a Poisson process: unbiased fit versus central moment analysis of time interval spectra, American Chemical Society Press (2007), Applied Modelling and Computations in Nuclear Science. T.M. Semkow, S. Pommé, S.M. Jerome and D.J. Strom, Eds. ACS Symposium Series 945, ISBN 0-8412-3982-7, pp. 316-334.

* S. Pommé, Dead time, pile-up, and counting statistics, American Chemical Society Press (2007), Applied Modelling and Computations in Nuclear Science. T.M. Semkow, S. Pommé, S.M. Jerome and D.J. Strom, Eds. ACS Symposium Series 945, ISBN 0-8412-3982-7, pp. 218-233.

* S. Pommé, Problems with the uncertainty budget of half-life measurements, American Chemical Society Press (2007), Applied Modelling and Computations in Nuclear Science. T.M. Semkow, S. Pommé, S.M. Jerome and D.J. Strom, Eds. ACS Symposium Series 945, ISBN 0-8412-3982-7, pp. 282-292.

* J.D. Keightley, DCC-SIM : A simulation routine for the validation of $4\pi\beta$–$\gamma$ digital coincidence counting software, American Chemical Society Press (2007), Applied Modelling and Computations in Nuclear Science. T.M. Semkow, S. Pommé, S.M. Jerome and D.J. Strom, Eds. ACS Symposium Series 945, ISBN 0-8412-3982-7, pp. 234-248.

* T.M. Semkow, S. Pommé, S.M. Jerome and D.J. Strom (Eds.), Applied Modelling and Computations in Nuclear Science, ACS Symposium Series 945, American Chemical Society, Washington, DC, USA (2007), ISBN 0-8412-3982-7.

* S. Pommé, The solid angle subtended by a circular detector for a linear source, Appl. Radiat. Isot. 65 (2007) pp. 724-727.

* S. Pommé, Methods for primary standardization of activity, Metrologia 44 (2007) pp. S17-S26.

* G. Sibbens and T. Altzitzoglou, Preparation of radioactive sources for radionuclide metrology, Metrologia 44 (2007) pp. S71-S78.

* S. Pommé and J. Paepen, A series expansion of Conway's generalised solid-angle formulas, Nucl. Instr. and Meth. A 579 (2007) pp. 272-274.

* G. Ratel, C. Michotte, H. Janssen, K. Kossert, G. Sibbens, T. Altzitzoglou, S. Pommé, M. Woods, S. Judge - BIPM Comparison BIPM.RI(II)-K1.Np-237 of Activity Measurements of the Radionuclide 237Np and Links for the 1998 Regional Comparison EUROMET.RI(II)-K2.Np-237 - Metrologia 44 (2007) pp. 1-16.

* S. Pommé, Comments on "A comparison of different analytical

methods of determining the solid angle of a circular coaxial source-detector system", Appl. Radiat. Isot. 65 (2007) 1065-1069.

* Y. Spasova, S. Pommé and U. Wätjen, Visualisation of interlaboratory comparison results in PomPlots, Accreditation and Quality Assurance 12 (2007) 623-627.

* Y. Spasova, S. Pommé, L. Benedik and U. Wätjen, Uncertainty budget for $^{226}$Ra activity concentration in water by alpha spectrometry, Acta Chimica Slovenica 54 (2007) 854-858.

IN PROGRESS

* S. Pommé, J. Camps, R. Van Ammel and J. Paepen, Protocol for uncertainty assessment of half-lives, J. Radioanal. Nucl. Chem. 276 (2008) 335-339.

* S. Pommé, E. García-Toraño, G. Sibbens, S. Richter, R. Wellum, A. Stolarz and A. Alonso, $^{234}$U/$^{235}$U activity ratios as a probe for the $^{238}$U/$^{235}$U half-life ratio, J. Radioanal. Nucl. Chem. 277 (2008) 207-210.

* S. Pommé and Y. Spasova, A practical procedure for assigning a reference value and uncertainty in the frame of an interlaboratory comparison, Accreditation and Quality Assurance 13 (2008).

* S. Pommé and G. Sibbens, Alpha-particle counting and spectrometry in a primary standardisation laboratory, Acta Chimica Slovenica 55 (2008).

* S. Pommé, Cascades of pile-up and dead time, Appl. Radiat. Isot.

* S. Pommé, T. Altzitzoglou, R. Van Ammel, G. Sibbens, A. Verbruggen, R. Eykens, J. Camps, K. Kossert, H. Janssen, Eduardo García Toraño, T. Durán and F. Jaubert; Experimental determination of the U-233 half-life, Appl. Radiat. Isot.

* G. Sibbens, T. Altzitzoglou, L. Benedik, S. Pommé, R. Van Ammel, $\alpha$-particle and $\gamma$-ray spectrometry of a plutonium solution for impurity determination, Appl. Radiat. Isot.

* C. Michotte, S. Courte, G. Sibbens, J. Camps, J. Paepen, Study of self-attenuation in a solution of $^{237}$Np measured in ionization chambers.

* Half-life determination of $^{55}$Fe, $^{54}$Mn, $^{109}$Cd, $^{233}$U, $^{235}$U, $^{238}$U.

* Development of the new reference ionisation chamber.

* EUROMET project 907: Measurement of $^{124}$Sb activity and determination of photon emission probabilities.

* EUROMET project no 749: Alpha-particle emission probabilities and energies in the decay of $^{240}$Pu.

* Analytical model for efficiency calculation NaI-well and improvement model by Sima.

* Uncertainty calculations for counting at defined solid angle.
* Development of software for 4π γ-counting.
* Improvement of ALPHA program for deconvolution of alpha-particle spectra.

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| LABORATORY | European Commission - Joint Research Centre<br>Institute for Reference Materials and Measurements (IRMM)<br>Radionuclide Metrology Sector |
| NAMES | Mikael Hult, Gerd Marissens, Joël Gasparro, Elisabeth Wieslander, Patric Lindahl, Uwe Wätjen |
| APPARATUS<br>ACTIVITY | Seven underground HPGe-detectors for ultra low level gamma-ray spectrometry. |
| RESULTS | * First detection of charged particle leakage from a fusion plasma by measuring low activity induced in small metal disks<br>* Radionuclides as a means to check authenticity of organic farming<br>* Radiation protection (i) Low-levels of $^{60}$Co in steel from Hiroshima up to 1500 m from epicentre in order to verify the Dosimetry System 02. (ii) neutron dosimetry based on a spectrometry using activation of metal disks and spectral deconvolution.<br>* Radiopurity measurements of various materials for the GERDA experiment and ultra low-background detector development in HADES. |
| PUBLICATIONS | * M. Hult, Low-level gamma-ray spectrometry using Ge-detectors Metrologia 44 (2007) pp.S87-S94. Erratum at Metrologia 44, p. 425<br>* D. Budjáš, M. Heisel, M. Hult, A. Klimenko, M. Laubenstein, P. Lindahl, H. Simgen, A. Smolnikov, C. Tomei, A Comparison of Low-level Gamma-spectrometers within the GERDA Collaboration, AIP Conf. Proc. 897 (2007) 26-31.<br>* G. Lövestam, M. Hult, A. Fessler, T. Gamboni, J. Gasparro, W. Geerts, P. Lindahl, S. Oberstedt and H. Tagziria, A novel technique for measuring neutron activation cross section curves, Nucl. Instr. Meth A. 580 (2007), 1400-1409.<br>* P. Lindahl, M. Hult, F. Cordeiro, J. Gasparro, A. Maquet, G. Marissens and P. Kockerols, Improvements in underground gamma-ray spectrometry and the application of measuring radioactivity in agricultural samples, in: Environmental Radiochemical Analysis III, ed. P. Warwick, Royal Society of Chemistry Publishing, Special Publication No. 312, Cambridge (2007) 86-94.<br>* G. Bonheure, M. Hult, J. Gasparro, and S. Popovichev Measurements of MeV particles from JET fusion plasmas based on the activation technique, Physica Scripta 75 (2007) 769-773.<br>* Zs. Szántó, M. Hult, U. Wätjen and T. Altzitzoglou, Current radioactivity content of wild edible mushrooms – a candidate for an |

environmental reference material, J. of Radionalytical and Nuclear Chemistry 273, No. 1 (2007) 167-170.

IN PROGRESS

* Decay data for long-lived radionuclides and double beta decay
* Neutron cross sections, neutron dosimetry and plasma characterisation using activation of metal discs
* Environmental radioactivity
* Intercomparison work
* Ultra low background detector developments

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Mikael Hult

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| LABORATORY | European Commission - Joint Research Centre<br>Institute for Reference Materials and Measurements (IRMM)<br>Radionuclide Metrology Sector |
| NAMES | Timotheos Altzitzoglou, Uwe Wätjen |
| APPARATUS ACTIVITY | * 4 HPGe detector systems (incl. low background detectors)<br>* 2 low and ultra low level liquid scintillation spectrometers<br>* facilities for radiochemical separations<br>* quantitative radioactive source preparation facilities |
| RESULTS | * Reference values for radioactivity in the IAEA-152 milk powder reference material<br>* Measurement comparison "$^{137}$Cs in air filters" completed<br>* Measurement comparison "$^{137}$Cs, $^{40}$K and $^{90}$Sr in milk powder" completed |
| PUBLICATIONS | * U. Wätjen, Zs. Szántó, T. Altzitzoglou, G. Sibbens, J. Keightley, R. Van Ammel, M. Hult and M. De Cort, Evaluation of EC measurement comparison on simulated airborne particulates - $^{137}$Cs in air filters, Report EUR 22926 EN (2007), ISBN 978-92-79-06962-8.<br>* Zs. Szántó, M. Hult, U. Wätjen and T. Altzitzoglou, Current radioactivity content of wild edible mushrooms: A candidate for an environmental reference material, J. Radioanal. Nucl. Chem. 273 (2007) 167-170.<br>* G. Sibbens and T. Altzitzoglou, Preparation of radioactive sources for radionuclide metrology, Metrologia 44 (2007) pp. S71-S78. |
| IN PROGRESS | * EUROMET project 907: Measurement of $^{124}$Sb activity and determination of photon emission probabilities<br>* EUROMET project no 749: Alpha-particle emission probabilities and energies in the decay of $^{240}$Pu; gamma-ray emission probability measurements<br>* Development of a new TDCR LSC<br>* T. Altzitzoglou, A. Bohnstedt, Characterisation of the IAEA-152 milk powder reference material for radioactivity with assigned values traceable to the SI units, Appl. Radiat. Isot. (in press).<br>* T. Altzitzoglou, Radioactivity determination of individual radionuclides in a mixture by liquid scintillation spectra deconvolution, Appl. Radiat. Isot. (in press).<br>* S. Pommé, T. Altzitzoglou, R. Van Ammel, G. Sibbens, A. Verbruggen, R. Eykens, J. Camps, K. Kossert, H. Janssen, Eduardo |

García Toraño, T. Durán and F. Jaubert; Experimental determination of the U-233 half-life, Appl. Radiat. Isot. (in press).

* G. Sibbens, T. Altzitzoglou, L. Benedik, S. Pommé, R. Van Ammel, α-particle and γ-ray spectrometry of a plutonium solution for impurity determination, Appl. Radiat. Isot. (in press).

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| LABORATORY | European Commission - Joint Research Centre<br>Institute for Reference Materials and Measurements (IRMM)<br>Radionuclide Metrology Sector |
| NAMES | Ljudmila Benedik, Mirela Vasile, Yana Spasova, Bozhidar Slavchev (INRNE, Sofia), Timotheos Altzitzoglou, Uwe Wätjen |
| APPARATUS ACTIVITY | * development of reference material<br>* organisation of measurement comparisons<br>* facilities for radiochemical separations<br>* quantitative radioactive source preparation facilities<br>* large solid angle α-particle spectrometers<br>* primary standardisation equipment when needed<br>* HPGe detector systems and LSC when needed |
| RESULTS | * Measurement comparison "$^{137}$Cs in air filters" completed<br>* Measurement comparison "$^{137}$Cs, $^{40}$K and $^{90}$Sr in milk powder" completed<br>* $^{210}$Po determination in 5 waters, successful participation in the corresponding IAEA proficiency test |
| PUBLICATIONS | * U. Wätjen, Zs. Szántó, T. Altzitzoglou, G. Sibbens, J. Keightley, R. Van Ammel, M. Hult and M. De Cort, Evaluation of EC measurement comparison on simulated airborne particulates - $^{137}$Cs in air filters, Report EUR 22926 EN (2007), ISBN 978-92-79-06962-8.<br>* Zs. Szántó, M. Hult, U. Wätjen and T. Altzitzoglou, Current radioactivity content of wild edible mushrooms: A candidate for an environmental reference material, J. Radioanal. Nucl. Chem. 273 (2007) 167-170.<br>* Y. Spasova, S. Pommé and U. Wätjen, Visualisation of interlaboratory comparison results in PomPlots, Accreditation and Quality Assurance 12 (2007) 623-627.<br>* Y. Spasova, S. Pommé, L. Benedik and U. Wätjen, Uncertainty budget for $^{226}$Ra activity concentration in water by alpha spectrometry, Acta Chimica Slovenica 54 (2007) 854-858.<br>* U. Wätjen and E. Guadagnino, How and why to certify reference materials, Rivista della Stazione Sperimentale del Vetro **37**, no. 6 (2007) 13 - 17. |
| IN PROGRESS | * Measurement comparison "Ra and U in mineral waters"<br>* Development of reference material IRMM-426 "wild berries" certified for activity of $^{137}$Cs, $^{40}$K and $^{90}$Sr<br>* U. Wätjen, Y. Spasova and T. Altzitzoglou, Measurement Comparisons of Radioactivity Among European Monitoring Laboratories for the Environment and Food Stuff, Appl. Radiat. Isot. |

(in press) - 16th International Conference on Radionuclide Metrology and its Applications (ICRM 2007), Cape Town

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| LABORATORY | **SCK·CEN, Low Level Radioactivity Measurements (SA1/SA2)** |
| NAMES | C. Hurtgen, F. Verrezen. |
| ACTIVITY | Gross alpha and beta, $^{3}H$, $^{14}C$, $^{89\text{-}90}Sr$, $^{131}I$, $^{210}Po$, $^{226}Ra$ and actinides activity measurements in environmental samples<br>Assay of actinides ( Th, U, Pu, Am...) in biological samples (urine, faeces) and environmental samples (water, sediment, soil ...) by alpha spectrometry and by KPA for U.<br>Assay of $^{14}C$, $^{63}Ni$, $^{99}Tc$, $^{129}I$ in low level waste |
| KEYWORDS | Alpha spectrometry, measurement, environmental control, gas proportional counter, liquid scintillation, low-level, radiochemistry. |
| RESULTS | Comparative study of selected scintillation cocktails. |
| PUBLICATIONS | Verrezen F., Loots H. and Hurtgen C. *"A performance comparison of nine selected liquid scintillation cocktails"* ,ICRM 2007 proceedings, Cape Town South Africa. 3 – 7 September 2007. |
| IN PROGRESS | Informatisation and integration of our ZnS α counting chain for low-level global α measurements into the QA system of our laboratory. |
| ADDRESS | Low Level Radioactivity Measurements<br>SCK•CEN<br>Boeretang 200<br>B-2400 Mol Belgium<br>Telephone: (+32-14) 33 28 31<br>Telecopier: (+32-14) 32 10 56<br>E-mail:churtgen@sckcen.be<br>Web: http://www.sckcen.be/lrm |
| CONTACT | C. Hurtgen |

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| LABORATORY | **SCK·CEN, Reactor & Nuclear Measurements (SA1/SA2)** |
| NAMES | M. Bruggeman, P. Vermaercke, P. Willeborts, |
| ACTIVITY | γ–spectrometry,<br>Preparation of Radioactive Standards,<br>Neutron activation analysis with relative NAA and $k_0$ - method<br>Non-destructive assay of nuclear wastes and special nuclear material (γ–spectrometry and neutron counting) |
| KEYWORDS | coincidence counting, gamma-ray spectrometry, gas proportional counter, ionisation chamber, low-level, NaI well counter, neutron measurement, simulation code, source preparation, X-ray spectrometry. |
| RESULTS | • Determination of the parameters F and α using the Cd-ratio for multi-monitor method in $k_0$ NAA<br>• Validation of $k_0$ NAA for stainless steel samples |
| PUBLICATION | Cincu E., Manea I, Barbos D, Sima O, Gustavsson I, Vermaercke P., Vajda N, Molnar Z, Polkowska-Motrenko H. - *Comparative performance of INAA and other spectroscopy techniques in the elemental analysis of stainless steel materials.* - Journal of Radioanalytical and Nuclear Chemistry 274 (2007) 199-205.<br>Leal A.S., Krambrock K., Ribeiro L.G.M., Menezes M.A.B.C., Vermaercke P., Sneyers L. - *Study of neutron irradiation-induced colors in Brazilian topaz.* - Nuclear Instruments and Methods in Physics Research A 580 (2007) 423-426. |
| IN PROGRESS | • develop a procedure to measure $^{32}P$ by NAA;<br>• develop dedicated LIMS for the laboratories NAA and Gamma-ray spectrometry;<br>• improve simulation tool for efficiency transfer in gamma-ray spectrometry;<br>• develop coincidence summing correction tool with editable nuclear data library;<br>• calibration a HPGe well detector to be used in $k_0$-NAA;<br>• develop procedure for the determination of U-isotopic ratios by $k_0$ NAA;<br>• validation of determination of Sn by $k_0$ NAA;<br>• co-organisation of a European inter-laboratory test for Nondestructive Assay (NDA) of nuclear wastes; |
| ADDRESS | Reactor and Nuclear Measurements<br>SCK•CEN, GKD<br>Boeretang 200<br>B-2400 Mol Belgium<br><br>Telephone: (+32-14) 33 28 86,<br>Telecopier: (+32-14) 32 10 56<br>E-mail: michel.bruggeman@sckcen.be; peter.vermaercke@sckcen.be<br>Web, (under construction) |
| CONTACT | M. Bruggeman |

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| LABORATORY | **SCK•CEN, Radio-Chemical Analysis laboratories (RCA) (SA1/SA2)** |
| NAMES | L. Adriaensen, M. Gysemans |
| ACTIVITY | • Destructive radiochemical analysis of spent fuels for the determination of burn-up and for spent fuel characterization programs<br>• Determination of Pu and $^{241}$Am concentration in MOX fuels (accredited according to ISO17025).<br>• Radiochemical analysis of long-lived and radiotoxic nuclides in various types of radioactive waste such as resins, evaporator concentrates, filters, incinerator ashes...<br>• Study of separation chemistry of actinides and specific radionuclides<br>• Radiochemical analysis of reactor dosimeters and irradiated reactor materials. |
| KEYWORDS | Alpha spectrometry, beta spectrometry, gamma-ray spectrometry, low-level, NaI well counter, mass spectrometry, radiochemistry |
| RESULTS | • Burn-up determination and spent fuel characterization for the international program MALIBU<br>• Radiochemical separation and analyses of activation products in nuclear vessel samples for retro-dosimetry ($^{55}$Fe, $^{63}$Ni, $^{94}$Nb, $^{60}$Co)<br>• Participation in the PHEBUS project: gamma measurements of leach solutions of aerosol filtering samples |
| PUBLICATIONS | Adriaensen L., Gysemans M., Hurtgen C., Boulanger D.- *Determination of Pm-147 in spent fuel samples in the framework of the Malibu program*.- ENC2007 proceedings.- Brussel, Belgium, 17-19 September 2007 |
| IN PROGRESS | • Dissolution, separation and analysis of $^{36}$Cl in radioactive concrete or metal samples<br>• Dissolution and separation of thorium in Th-based spent fuels in the framework of LWR-Deputy, a program funded by the EC in FP6 |
| ADDRESS | Radio-Chemical Analysis<br>SCK•CEN<br>Boeretang 200,<br>B-2400 Mol, Belgium<br>Telephone: (+32-14) 33 32 26<br>Fax: (+32-14) 32 07 55<br><br>E-mail: ladriaen@sckcen.be |
| CONTACT | L. Adriaensen |

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| **LABORATORY** | Laboratório Nacional de Metrologia das Radiações Ionizantes LNMRI/IRD/CNEN |
| NAMES | A. Iwahara, Antônio E. de Oliveira, Carlos J. da Silva, E.M.O. Bernardes, P.A.L. da Cruz, J. dos S. Loureiro, José U. Delgado, R. Poledna, M.A.R.R. di Prinzio, Vanessa de Bonis |
| ACTIVITY | 1- Participation in international comparisons ;<br>2- Absolute activity measurements ;<br>3- Traceability program with Nuclear Medicine Services |
| RESULTS | 1- Standardization of $^{67}$Ga, $^{124}$Sb, $^{51}$Cr and $^{55}$Fe solutions ;<br>2- Implantation of 4πβ(LSC)-(NaI(Tl)) anticoincidence system with LNHB MTR2 modules<br>3- Comparison runs of activity measurements of $^{99}$Tc$^{m}$, $^{131}$I, $^{67}$Ga and $^{201}$Tl with Nuclear Medicine Services |
| PUBLICATIONS | 1- L. Tauhata, A. Iwahara, A.E. de Oliveira, E.A. Rezende, J.A. dos Santos, I.G. Nícoli, F.G. Alabarse, A.M. Xavier. Proficiency test applied in the activity measurements of radiopharmaceuticals realized by Brazilian nuclear medicine centres during the 7 years of interlaboratorial comparisons programme. Enqualab-2007, Congress of Quality in Metrology, 11-14 June 2007, São Paulo, Brazil (in Portuguese).<br>2- Carlos J. da Silva, A. Iwahara, R. Poledna, E.M. de O. Bernardes, M.A.R.R. de Prinzio, Ricardo T. Lopes. Standardization of $^{67}$Ga, $^{51}$Cr and $^{55}$Fe by live-timed anti-coincidence counting wiht extending dead time. Appl. Radiat. Isot. 66 (2008) 231-235. |
| IN PROGRESS | 1- Primary activity standardization and gamma intensities determination of $^{124}$Sb<br>2- Participation in international comparison of $^{57}$Co activity measurements<br>3- Primary standardization of $^{22}$Na by coincidence and sum-peak methods<br>4- Primary standardization of $^{177}$Lu by coincidence and anti-coincidence counting method |
| ADDRESS | Instituto de Radioproteção e Dosimetria, Av. Salvador Allende, s/n, Recreio, CEP 22780-160, Rio de Janeiro, Brasil.<br>Tel: ++55 21 2173 2879<br>Fax: ++55 21 2442 1605<br>E-maiL: iwahara@ird.gov.br |
| CONTACT | A.Iwahara |

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| **LABORATORY** | Laboratório Nacional de Metrologia das Radiações Ionizantes LNMRI/IRD/CNEN |
| NAMES | E.M.O. Bernardes, J.U. Delgado, M.A.R.R. di Prinzio, Maria C.M. de Almeida, R. Poledna. |
| ACTIVITY | 1 - Half-life determination.<br>2 - Impurities study by gamma-ray spectrometry.<br>3- Determination of photon emission probabilities |
| RESULTS | Measurements of nuclear data parameters in the standardization of $^{124}$Sb. |
| PUBLICATIONS | 1- M.C.M. de Almeida, A. Iwahara, R. Poledna, C.J. da Silva, J.U. Delgado. Absolute disintegration rate and 320 keV γ-ray emission probability of $^{51}$Cr. Nucl. Instr. and Meth. In Phys. Research, A 580 (2007) 165-168.<br>2- M.C.M. de Almeida, R. Poledna, Estela M. De Oliveira, J.U. Delgado and Ronaldo L. Silva. Metrological determination of natural radioactive isotopes $^{226}$Ra, $^{228}$Ra and $^{210}$Pb by means of Ge Detectors. 8 $^{th}$ International Symposium on the natural Radiation Environment, Buzios; 2007. |
| IN PROGRESS | 1-The Metrological Activity Determination of the $^{238}$U and $^{230}$Th by Gamma Spectrometry to Industrial Fuel-Cycle application;<br>2- Precise Determination of Ge Detector Efficiency Curves for Obtaining Activities in Radioclides Gamma-Emitters |
| ADDRESS | Instituto de Radioproteção e Dosimetria, Av. Salvador Allende, s/n, Recreio, CEP 22780-160, Rio de Janeiro, Brazil.<br><br>Tel: ++55 21 3411 8173<br><br>Fax: ++55 21 2442 1605 EmaiL :delgado@ird.gov.br |
| CONTACT | J. U. Delgado |

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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- Preparation of the spiked sources of beta, alpha and multi-gamma emitters in water matrix;<br>3- Participation in international comparisons |
| RESULTS | 1- Quality control program of environmental laboratories ;<br>2- Preparation of reference material soil from Poços de Caldas and Goiânia Regions in Brazil |
| PUBLICATIONS | 1- Clain, Almir Faria; Azeredo, A.M.G.F; Bragança, M.J.C.S; Tauhata, Luiz; Bernardes, E.M.O.Vienna; Comparison between two methods for spiked soil preparation; International conference on Environmental Radioactivity;Viena 2007<br>2- Clain, Almir Faria; Azeredo, A.M.G.F; Bragança, M.J.C.S; Tauhata, Luiz; Bernardes. Preparation of radioactive environmental samples by the reference material group from IRD., E.M.O. 8 th International Symposium on the natural Radiation Environment, Buzios; 2007 |
| IN PROGRESS | Production soil spike samples and air filter |
| 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 |

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| LABORATORY | **Laboratory for Measurements of Low-level Radioactivity** |
| NAMES | Bogomil Obelic, Nada Horvatincic, Ines Krajcar Bronic, Jadranka Barešic, Andreja Sironic, Anita Rajtaric |
| ACTIVITY | • Radiocarbon dating of archaeological, geological and paleontological samples<br>• Tritium activity measurements of natural waters<br>• Use of stable ($^{2}$H, $^{13}$C, $^{18}$O) and natural radioactive isotopes ($^{3}$H, $^{14}$C) in hydrogeological studies<br>• Use of isotopes in paleoclimatological studies<br>• Use of isotopes in ecological studies<br>• Monitoring of $^{14}$C in biological samples around nuclear power plant<br>• Physico-chemical and isotopic study of processes in karst environment, particularly in carbonate sediments, and water-sediment interaction<br>• Participation in intercomparison excercises<br>• Participation in IAEA/WMO project: *"Global Network of Isotopes in Precipitation (GNIP) and Isotope Hydrology Information System (ISOHIS)"*. Data for stations Zagreb and Ljubljana since 1976<br>• Participation in ICRU projects "Elastic scattering of electrons and positrons" and "Key Data for Measurement Standards in the Dosimetry of Ionizing Radiation" |
| APPARATUS | • Vacuum lines for chemical preparation of methane from samples for $^{14}$C and $^{3}$H measurements<br>• Two gas proportional counters for measurement of $^{14}$C and $^{3}$H activity in proportional counters<br>• Two vacuum lines for chemical preparation of benzene for $^{14}$C measurement by LSC<br>• Vacuum line for direct absorption of $CO_2$ for $^{14}$C measurement by LSC<br>• *Quantulus 1220* ultra low-level liquid scintillation counter (LSC) |
| KEYWORDS | (anti) coincidence method, data evaluation, data measurement,, environmental monitoring, gas proportional counter, liquid scintillation, accelerator mass spectrometry, dating, low-level, radionuclides C-14, H-3 |
| RESULTS | |
| PUBLICATIONS<br>(for last 5 years) | 1. N. Horvatincic, I. Krajcar Bronic, B. Obelic: Differences in the $^{14}$C age, $\delta^{13}$C and $\delta^{18}$O of Holocene tufa and speleothem in the Dinaric Karst. Palaeogeography, Palaeoclimatology, Palaeoecology. 193 (2003) 139-157.<br>2. B. Obelic, M. Krznaric-Škrivanko, B. Marijan, I. Krajcar Bronic: Radiocarbon dating of Sopot culture sites (Late Neolithic) in Eastern Croatia. Radiocarbon 46/1 (2004) 245-258.<br>3. N. Horvatincic, J. Barešic, I. Krajcar Bronic, B. Obelic: Measurements of low $^{14}$C activities in a liquid scintillation counter in the Zagreb Radiocarbon Laboratory. Radiocarbon 46/1 (2004) 105-116.<br>4. M. Suric, M. Juracic, N. Horvatincic, I. Krajcar Bronic: Late Pleistocene - Holocene sea-level changes and pattern of karstic coasts submersion - records from submerged speleothems along the Eastern Adriatic Coast (Croatia). Marine Geology 214/1-3 (2005) 163-175. |

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| | 5. M. Suric, N. Horvatincic, A. Suckow, M. Juracic, J. Barešic: Isotope records in submarine speleothems from the Adriatic coast, Croatia, Bulletin de la Société géologique de France **176** (2005) 363-373<br>6. N. Horvatincic, I. Krajcar Bronic, J. Barešic, B. Obelic, S. Vidic: Tritium and stable isotope distribution in the atmosphere at the coastal region of Croatia, In: Isotopic composition of precipitation in the Mediterranean Basin in relation to air circulation patterns and climate. IAEA-TECDOC-1453, 37-50, IAEA 2005.<br>7. P. Vreca, I. Krajcar Bronic, N. Horvatincic, J. Barešic: Isotope characteristics of precipitation in Slovenia and Croatia: Comparison of continental and maritime stations. Journal of Hydrology 330 (2006) 457-469.<br>8. J. Barešic, N. Horvatincic, I. Krajcar Bronic, B. Obelic, P. Vreca: Stable isotope composition of daily and monthly precipitation in Zagreb, Isotopes in Environmental and Health Studies 42/3 (2006) 239-249.<br>9. N. Horvatincic, J. L. Briansó, B. Obelic, J. Barešic, I. Krajcar Bronic: Study of eutrophication process in the Plitvice Lakes by water and sediment composition. Water, Air & Soil Pollution: Focus 6 (2006) 475-485<br>10. I. Krajcar Bronic, P. Vreca, N. Horvatincic, J. Barešic, B. Obelic: Distribution of isotopic composition of hydrogen, oxygen and carbon in the atmosphere of Croatia and Slovenia. Arhiv za higijenu rada i toksikologiju 57/1 (2006) 23-29<br>11. I. Krajcar Bronic, K. Minichreiter: $^{14}$C dating of early Neolithic settlements in Northern Croatia. Nucl. Instrum. Meth. A 580 (2007) 714-716.<br>12. B. Obelic, I. Krajcar Bronic, J. Barešic, Ž. Pekovic, A. Miloševic: Dating of the Old Bridge in Mostar, Bosnia and Herzegovina. Radiocarbon 49/2 (2007) 617-623<br>13. Krajcar Bronic, M. Kimura: Radiation physics and chemistry in heavy-ion cancer therapy. Chemistry in Industry 56/12 (2007) 643-654<br>14. F. Salvat (Chairman), M.J. Berger, A. Jablonski, I. Krajcar Bronic, J. Mitroy, C.J. Powel, L. Sanche: ICRU Report 77 – Elastic scattering of electrons and positrons, Journal of the ICRU 7/1 (2007), pp. 169 |
| IN PROGRESS | • Development of graphite preparation for $^{14}$C AMS measurement technique<br>• Project INCO-CT-2006-043584 (FP6): *"AMS-14C - Preparation of carbon samples for $^{14}$C dating by the AMS technique"*<br>• Implementation of QA/QC according to ISO 17025<br>• Implementation of tritium enrichment system |
| INFORMATION SOURCE | http://www.irb.hr/-ONy8-/en/str/zef/z3labs/lna/ |
| IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | **Laboratory for Measurements of Low-level Radioactivity (**Radiocarbon and Tritium Laboratory)<br>Rudjer Boškovic Institute<br>Bijenicka 54<br>10000 Zagreb, Croatia<br>phone: 00385 1 4680219, or 00385 1 4571 271<br>fax: 00385 1 4680 239 |
| CONTACT | Ines Krajcar Bronic, krajcar@irb.hr |

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| LABORATORY | Czech Metrology Institute<br>Inspectorate for Ionizing Radiation<br>Prague, Czech Republic |
| NAMES | J. Sochorová , M.Havelka, P. Auerbach |
| APPARATUS | 4π(PC)ß-γ coincidence equipment<br>4π(PPC)X,e-γ coincidence equipment<br>4π NaI(Tl) detector<br>4π LS ß-γ coincidence equipment |
| RESULTS | Standardization of $^{55}$Fe for CCRI(II) international comparison.<br>Standardization of $^{124}$Sb for EUROMET Project 907.<br>Routine standardization of 30 radionuclides. |
| PUBLICATION | J.Sochorová, P.Auerbach, M.Havelka, Application of "wet" extrapolation method for activity standardisation of electron capture radionuclides, in press in Appl. Radiat. Isot.<br>M. Havelka, J. Sochorová, Standardisation of $^{56}$Co and $^{57}$Co using software coincidence counting system, in press in Appl. Radiat. Isot. |
| IN PROGRESS | Development of software for TDCR system.<br>Standardisation of electron capture radionuclides using software coincidence counting system. |
| ADDRESS | CMI - IIZ<br>Radiová 1<br>CZ-102 00 Praha 10<br>Czech Republic<br>tel.: +420 266020497<br>fax: +420 266020466<br>E-mail: pdryak@cmi.cz |
| CONTACT | P. Dryák |

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| LABORATORY | Czech Metrology Institute<br>Inspectorate for Ionizing Radiation<br>Prague, Czech Republic |
| NAMES | P.Dryák, P.Kovár |
| APPARATUS | HPGe detectors for gamma spectrometry<br>Si and Si(Li) detectors for alpha and beta spectrometry<br>DSPs 9660, AIMs 556A, GENIE2000 |
| RESULTS | Radionuclide impurities measurement<br>Environmental samples measurement<br>Standards production checking (activity measurement)<br>Verification, type testing and calibration for alpha, beta and gamma spectrometers used in the Czech Republic, Slovakia, Bulgaria and Georgia<br>Noble gases standardization<br>Monte Carlo calculation of HPGe detector efficiency |
| PUBLICATION | P.Dryák, P.Kovár, Determination of emission probabilities of gamma photons in the decay of Co-56, in press in ARI<br>P.Kovár, P.Dryák, Gaseous standards preparation with the radionuclide Ar-41 for stack monitors calibration and verification in nuclear facilities, in press in ARI |
| IN PROGRESS | Standardization of $^{41}$Ar, MC efficiency calculation |
| ADDRESS | CMI - IIZ<br>Radiová 1<br>CZ-102 00 Prague 10<br>Czech Republic<br>tel.: +420 266020497<br>fax: +420 266020466<br>E-mail:pdryak@cmi.cz |
| CONTACT | P.Dryák |

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| LABORATORY | SIS National Institute of Radiation Protection, Denmark |
| NAMES | Klaus Ennow |
| ACTIVITY | Distribution of Ge-68 solution to Hospitals in The Nordic Countries<br>Comparison of Dose Calibrators used for measurements of F-18 |
| KEYWORDS | ionisation chamber, life sciences, (Ge/Ga-68) |
| RESULTS | Extension of the service of the Nordic SSDL to Activity |
| PUBLICATIONS | |
| IN PROGRESS | Purchase, measurements and distribution of Ge-68 solutions. |
| INFORMATION | Project under Nordic Dosimetry Group under The Nordic Radiation protection Institutes. |
| SOURCE IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | National Institute of Radiation Protection<br>Knapholm 7<br>DK-2730 Herlev<br>Denmark<br>Direct Telephone: +45 44 54 34 97<br>E-mail : KLN@sis.dk |
| CONTACT | Klaus Ennow |

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| LABORATORY | Laboratoire National Henri Becquerel |
| NAMES | P. Cassette, F. Jaubert, I. Tartès |
| ACTIVITY | Liquid Scintillation Counting |
| KEYWORDS | Liquid scintillation |
| APPARATUS | Triple coincidence counters with Compton spectrometers<br>Commercial LS counters |
| RESULTS | Development of TDCR and tracer LS methods |
| PUBLICATIONS | P. Bienvenu, P. Cassette, G. Andreoletti, MM. Bé, J. Comte and MC. Lépy. A new determination of Se half-life. Applied Radiation and Isotopes. Vol 65, 3 (2007). *Pages 335-364.*<br><br>P. Cassette and Phuc Do. The Compton Source Efficiency Tracing method in Liquid Scintillation Counting, a new standardization method using a TDCR counter with a Compton spectrometer. ICRM 2008 conference, to be published by *Applied radiation and Isotopes*.<br><br>C. Ivan, P. Cassette, Maria Sahagia. A new TDCR-LS Counter using Channel Photomultiplier tubes. ICRM 2008 conference, to be published by *Applied radiation and Isotopes*. |
| IN PROGRESS | Development of a new TDCR counter with Compton spectrometer using CPM and data acquisition based on FPGA. |
| ADDRESS | DRT/DETECS/LNHB<br>CEA-Saclay<br>F-91191 Gif-sur-Yvette cedex, France<br>Tel : 33 1 69 08 48 68<br>Fax : 33 1 69 08 26 19<br>E-mail : Philippe.cassette@cea.fr |
| CONTACT | Philippe Cassette |

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| LABORATORY | Laboratoire National Henri Becquerel |
| NAMES | P. Cassette, F. Jaubert |
| ACTIVITY | Radon standardization |
| KEYWORDS | Radon |
| APPARATUS | Cryogenic defined solid angle alpha spectrometer |
| RESULTS | Standardization of $^{222}$Rn |
| PUBLICATIONS | P. Cassette, M. Sahagia, L. Grigorescu, M.C. Lépy and J.L. Picolo. Standardization of $^{222}$Rn by LSC and comparison with $a$- and $g$-spectrometry. Applied Radiation and Isotopes. Vol. 64, 10-11.*Pages 1465-1470.* |
| IN PROGRESS | Measurement of $^{220}$Rn |
| ADDRESS | DRT/DETECS/LNHB<br>CEA-Saclay<br>F-91191 Gif-sur-Yvette cedex, France<br>Tel : 33 1 69 08 48 68<br>Fax : 33 1 69 08 26 19<br>E-mail : Philippe.cassette@cea.fr |
| CONTACT | Philippe Cassette |

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| LABORATORY | Laboratoire National Henri Becquerel |
| NAMES | I. Tartès, F. Jaubert, P. Cassette |
| ACTIVITY | Characterization of liquid scintillators |
| KEYWORDS | Liquid scintillator |
| APPARATUS | Monochromatic X-ray source with detector and liquid sample holder<br>Compton spectrometer coupled with a TDCR LS counter |
| RESULTS | Measurement of photon absorption coefficients of liquid scintillator in the 1-15 keV energy range.<br>Measurement of the response of scintillators in the 1-10 keV energy range |
| PUBLICATIONS | P. Cassette, I. Tartès, F. Maguet, J. Plagnard, M.C. Lépy and F. Jaubert. Measurement of photon absorption coefficients of liquid scintillators in the 5 to 12 keV energy range using a monochromatic X-ray source. LSC 2005, Advances in Liquid Scintillation Spectrometry. Radiocarbon, the University of Arizona, 2006. |
| IN PROGRESS | Characterisation of commercial and locally developed LS cocktails<br>Study of the break of $^{90}$Sr/Y equilibrium during the preparation of LS sources |
| ADDRESS | DRT/DETECS/LNHB<br>CEA-Saclay<br>F-91191 Gif-sur-Yvette cedex, France<br>Tel : 33 1 69 08 48 68<br>Fax : 33 1 69 08 26 19<br>E-mail : Philippe.cassette@cea.fr |
| CONTACT | Philippe Cassette |

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| LABORATORY | LNE- Laboratoire National Henri Becquerel |
| NAMES | Marie-Christine Lépy, Johann Plagnard. |
| ACTIVITY | X-ray Spectrometry |
| APPARATUS | Si(Li) and HPGe Detectors<br>Tunable monochromatic X-ray source (1-20 keV) (SOLEX) |
| RESULTS | Characterization of a HPGe detector by scanning the absorption edges of the detector conponents<br>Measurement of linear attenuation coefficients and transmissions of different materials |
| PUBLICATIONS | J. Plagnard, C. Bobin, M.C. Lépy, "*Accurate efficiency calibration of low-energy HPGe detector using a monochromatic X-ray source", X*-Ray Spectrometry, 36 (2007) 191-198<br>J. Plagnard, M.C. Lépy **,** "*Use of tunable monochromatic X-ray sources for metrological studies in the low-energy range at the Laboratoire National Henri Becquerel*", to be published in the proceedings of International Conference on Nuclear Data for Science and Technology 2007 |
| IN PROGRESS | Characterization of a reference detector for semiconductor detectors efficiency calibration using a tunable monochromatic X-Ray source<br>Equipment of the metrology beamline at the SOLEIL synchrotron facility |
| ADDRESS | LNE/LNHB<br>CEA-Saclay<br>F-91191 Gif-sur-Yvette cedex, FRANCE<br>Tel : +33.1.69.08.24.48<br>Fax : +33.1.69.08.26.19<br>E-mail : marie-christine.lepy@cea.fr |
| CONTACT | Marie-Christine Lépy |

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| LABORATORY | LNE- Laboratoire National Henri Becquerel |
| NAMES | Johann Plagnard, Carine Hamon, Laurent Ferreux, Marie-Christine Lépy |
| ACTIVITY | Gamma-ray spectrometry |
| APPARATUS | Coaxial and planar HPGe Detectors |
| RESULTS | Efficiency calibration of HPGe detectors within 0.5 % for point sources.<br>Efficiency calibration for volume sources<br>L X-ray emission probabilities of $^{241}$Am |
| PUBLICATIONS | J. Plagnard, C. Hamon, M. C. Lépy, "*Study of scattering effects in low-energy gamma-ray spectrometry*", to be published in ARI<br><br>M. C. Lépy , J. Plagnard, L. Ferreux,"*Measurement of 241Am L X-Ray emission probabilities*" to be published in ARI<br><br>M.-C. Lépy, "*Total efficiency calibration for coincidence summing corrections* », NIM A 579 (2007) 584-587 |
| IN PROGRESS | Measurement of photon emision probabilities of $^{124}$Sb<br>Development and test of a software for fitting efficiency curves versus the energy taking account of correlations between input data |
| ADDRESS | CEA-LNE/LNHB<br>CEA-Saclay<br>F-91191 Gif-sur-Yvette cedex, FRANCE<br>Tel : +33.1.69.08.24.48<br>Fax : +33.1.69.08.26.19<br>E-mail : marie-christine.lepy@cea.fr |
| CONTACT | Marie-Christine Lépy |

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| LABORATORY | LNE- Laboratoire National Henri Becquerel |
| NAMES | G. Moutard, L. Ferreux |
| ACTIVITY | Organisation of national and international interlaboratory comparisons in the field of activity measurements.<br>Low-level activity measurement |
| APPARATUS | Calibrated HPGe, NaI(Tl), Liquid scintillation counters, Well-type ionisation chamber with standard electronics.<br><br>HPGe detector with anti-cosmic system |
| RESULTS | An opened intercomparison program is proposed every year by LNE-LNHB.<br>The test for 2007 was :<br>Mass activity measurement of a solution of $^{239}Pu$ (about 4 $kBq.g^{-1}$, 4 $Bq.g^{-1}$ and 5 $Bq.kg^{-1}$);<br><br>Determination of technically enhanced naturally occurring radionuclides (TENORM) in phosphogypsum (IAEA intercomparison) |
| IN PROGRESS | The proposed intercomparison program for 2008 is:<br><br>Mass activity measurement of tritiated water (about 40 $kBq.g^{-1}$, and 4 $Bq.g^{-1}$); |
| ADDRESS | LNE/LNHB<br>CEA-Saclay<br>F-91191 Gif-sur-Yvette cedex, FRANCE<br>Tel. : +33.1.69.08.43.75<br>Fax. +33.1.69.08.26.19<br><br>E-Mail : gerard.moutard@cea.fr |
| CONTACT | Gérard Moutard |

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| LABORATORY | Laboratoire National Henri Becquerel, France |
| NAMES | M.M. Bé, V. Chisté, C. Dulieu |
| ACTIVITY | Evaluation of Radionuclide Decay Data |
| KEYWORDS | data evaluation, $^{226}$Ra, $^{222}$Rn, $^{218}$Po, $^{218}$At, $^{218}$Rn, $^{214}$Pb, $^{214}$Bi, $^{214}$Po |
| RESULTS | Evaluation of $^{226}$Ra, $^{222}$Rn, $^{218}$Po, $^{218}$At, $^{218}$Rn, $^{214}$Pb, $^{214}$Bi, $^{214}$Po<br>http://www.nucleide.org/DDEP_WG/DDEPdata.htm |
| PUBLICATIONS | **M.-M. Bé, V.P. Chechev, R.Dersch, O.A.M. Helene, R.G. Helmer, M. Herman, S. Hlavac, A. Marcinkowski, G.L. Molnar, A.L. Nichols, E.Schönfeld, V.R. Vanin, M.J. Woods.** Update of X ray and gamma ray decay data standards for detector calibration and other applications. IAEA, Vienna (2007) in two volumes, ISBN92-0-113606-4<br>**V. Gorozhankin, M.M. Bé**<br>Assessment of internal conversion coefficients for anomalous electric dipole transitions. ICRM 2007, to be published<br>**C. Dulieu, M.M. Bé , V. Chisté**<br>Tools and publications for reference decay data, Proc. Int. Conf. on Nuclear Data for Science and Technology ND2007, Nice 23-27 avril.<br>**V.Chisté, M. M. Bé and C. Dulieu**<br>Evaluation of decay data of Radium-226 and its daughters, Proc. Int. Conf. on Nuclear Data for Science and Technology ND2007, Nice 23-27 avril.<br>**P. Bienvenu, P. Cassette, G. Andreoletti, M.-M. Bé, J. Comte, M.-C. Lépy**.<br>A new determination of $^{79}$Se half-life. Appl. Rad. Isotopes 65 (2007) 355. |
| IN PROGRESS | Evaluation of : $^{210}$Tl, $^{210}$Bi, $^{210}$Po, $^{252}$Cf, $^{139}$Ce<br>Publication of a new volume of the Monographie BIPM 5 is planned |
| INFORMATION | Pre study of : $^{44}$Sc, $^{44}$Sc$^{m}$, $^{47}$Sc, $^{55}$Co, $^{67}$Cu, $^{64}$Cu, $^{82}$Sr, $^{82}$Rb, $^{86}$Y, $^{89}$Zr, $^{117}$Sn$^{m}$, $^{124}$I, $^{211}$At, $^{223}$Ra. |
| OTHER RELATED PUBLICATIONS | Publication of a pocket table of radionuclides, **Mini Table de Radionucléides**<br>Publisher : EDP Sciences, ISBN 978-2-86883-973-2:<br>http://www.nucleide.org/news.htm |
| ADDRESS | CE Saclay<br>LNHB – PC 111<br>F- 91191 Gif sur Yvette Cedex<br>Tel : +33 1 69 08 46 41<br>Fax : +33 1 69 08 26 19<br>E-mail : mmbe@cea.fr |
| CONTACT | Marie-Martine Bé |

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| LABORATORY | Laboratoire National Henri Becquerel |
| NAMES | C. Bobin, J. Bouchard |
| APPARATUS ACTIVITY | $4\pi\beta-\gamma$ counting systems<br>Anticoincidence counting based on the live-time technique |
| PUBLICATIONS | Bobin C. *et al.,* 2007. Standardization of $^{67}$Ga using a $4\pi$(LS)$\beta-\gamma$ anti-coincidence system. Appl. Radiat. Isot. 65, 757-763.<br>Bobin C., 2007. Primary standardization of activity using the coincidence method based on analogue instrumentation. Metrologia 44, S27-S31. |
| IN PROGRESS | - Development of a $4\pi$(LS)$\beta-\gamma$ anticoincidence counting system using a liquid scintillation apparatus in the $\beta$-channel; TDCR measurements are combined with the coincidence method. Application to the tracer method ($^{14}$C, $^{55}$Fe).<br>- Study on freeze-dried sources. |
| ADDRESS | Laboratoire National Henri Becquerel<br>CEA/Saclay<br>F-91191 Gif-sur-Yvette Cedex, France<br>Tel.: 33 1 69 08 29 64 |
| CONTACT | Bobin Christophe<br>e-mail: christophe.bobin@cea.fr |

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| LABORATORY | Physikalisch-Technische Bundesanstalt |
| NAMES | Annette Röttger, Anja Honig |
| ACTIVITY | Radon measuring technique: Radon-220 (Thoron) progeny reference chamber and mixed atmosphere reference chamber (Radon-222, Radon-220 and their progenies) of the PTB. Production and measurement of reference atmospheres. Online α-spectrometry and offline simultaneous αγ-spectrometry. |
| KEYWORDS | Alpha spectrometry, environmental control, gamma-ray spectrometry radioactive gas, Rn-220, Rn-222 |
| RESULTS | Reference atmospheres for Rn-220, Rn-222 and their progenies. Calibration service possible by now. |
| PUBLICATIONS | |
| IN PROGRESS | Reference atmospheres for Rn-220 and Rn-220/Rn-222 mixtures with reduced uncertainties. |
| INFORMATION | BMU-Project: Generation and characterisation of reference atmospheres of thoron decay products for the calibration of measuring devices for thoron decay products (St.Sch.-Nr. 4453 by BMU/BfS) |
| SOURCE IN PREPARATION | Exhalation source system of ten Th-228 sources. |
| OTHER RELATED PUBLICATIONS | http://www.ptb.de/en/org/6/61/612/_index.htm |
| ADDRESS | Physikalisch-Technische-Bundesanstalt<br>Department 6.1<br>Bundesallee 100<br>D-38116 Braunschweig Germany<br>Tel. ++49-531-592-6104<br>Fax. ++49-531-592-8525<br>E-mail: Annette.Roettger@ptb.de |
| CONTACT | Annette Röttger |

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| LABORATORY | Physikalisch-Technische Bundesanstalt |
| NAMES | Ole Naehle |
| ACTIVITY | 4πβ-γ-coincidence counting<br>Liquid Scintillation Counting<br>TDCR<br>Calibration of large area reference sources |
| KEYWORDS | (anti) coincidence method, data measurement, gas proportional counter, liquid scintillation, NaI well-type counter, SIR, TDCR, large area sources |
| RESULTS | Activity determination of Sb-124 |
| PUBLICATIONS | |
| IN PROGRESS | Commissioning of a TDCR detector system<br>Setup of detector system to characterize large area reference sources<br>Activity determination of Ba-133 |
| INFORMATION | |
| IN PREPARATION | 1. Standardization and branching ratio EC/ $\beta^+$ of Na-22<br>2. Study of Light Emission Processes for the Design of Liquid Scintillation Counters |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | Physikalisch-Technische-Bundesanstalt<br>Department 6.1<br>Bundesallee 100,<br>D-38116 Braunschweig Germany<br>Tel. ++49-531-592-6322<br>Telefax: ++49-531-592-6305<br>E-mail: Ole.J.Naehle@ptb.de |
| CONTACT | Ole Naehle |

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| LABORATORY | Physikalisch-Technische Bundesanstalt |
| NAMES | Karsten Kossert |
| ACTIVITY | Improvement of liquid scintillation counting techniques for activity determinations, LS spectrometry and study of light transport in LS systems, efficiencies for electron-capture nuclides (CIEMAT/NIST and TDCR), measurements of decay data (e.g. half-lives of long-lived isotopes), Sb-124 Euramet project, application of ionization chambers with top priority to life sciences |
| KEYWORDS | CIEMAT/NIST, TDCR, electron-capture nuclides, LS spectrometry, half-lives |
| RESULTS | Analysis of shape-factor functions of Be-10, K-40, Rb-87 and Sr-90, National comparison on Tc-99m activity measurements |
| PUBLICATIONS | - Grau Carles, Kossert: Measurement of the shape-factor functions of the long-lived radionuclides $^{87}$Rb, $^{40}$K and $^{10}$Be. NIM A 572 (2007) 760.<br>- Schrader, Klein, Kossert: Activity standardization of $^{18}$F and ionization chamber calibration for nuclear medicine. ARI 65 (2007) 581.<br>+ several contributions to ICRM 2007 conference |
| IN PROGRESS | Measurement of the half-lives of Be-10, Ca-41 activity standardization |
| INFORMATION | |
| SOURCE IN PREPARATION | Improved LS spectrometry method for Cd-109, Activity standardization of Ca-41, …. |
| OTHER RELATED PUBLICATIONS | Kossert, Thieme: Comparison for quality assurance of $^{99m}$Tc activity measurements with radionuclide calibrators. ARI 65 (2007) 866 |
| ADDRESS | Physikalisch-Technische-Bundesanstalt<br>Department 6.1<br>Bundesallee 100<br>D-38116 Braunschweig Germany<br>Tel. ++49-531-592-6110<br>Fax. ++49-531-592-6305<br>E-mail: Karsten.Kossert@ptb.de |
| CONTACT | Karsten Kossert |

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| LABORATORY | Bhabha Atomic Research Centre |
| NAMES | Leena Joseph, Anuradha. R, Kulkarni D.B. |
| ACTIVITY | 1. 4π β(PC) γ(NaI) coincidence system<br>2. Calibrated 4p gamma ion chamber<br>3. HPGe detector assembly for gamma ray spectrometer<br>4. Dose calibrator CRC-15Beta (Capintec make)<br>5. Planar HPGe detector assembly for low energy photon spectrometer |
| KEYWORDS | coincidence method, gas proportional counter, ionisation chamber, SIR, source preparation, traceability, Sm-153, Co-60, Cs-134, P-32, Tc-99m |
| RESULTS | 1. Standardised $^{153}$Sm solution<br>2. Standardised $^{60}$Co and $^{134}$Cs to be used as tracers for standardisation of $^{32}$P<br>3. Conducted audit for Tc-99m activity measurements among seven NMCs in Mumbai, India<br>4. The report of the intercomparison of $^{131}$I activity measurements conducted among 70 NMCs in the 2006 was completed and results were send to all the participants. 94% of the results were within a deviation ±10% and 6% of the results were with deviation more than ±10%<br>5. Calibrated radioactive sources for users |
| PUBLICATIONS | 1. Quality Audit Programme for Radioactivity Measurements with Dose Calibrators, by Leena Joseph, R. Anuradha, D. B. Kulkarni. Presented at the ICRM – 2007 conference, South Africa, September 03 to 07, 2007<br>2. International intercomparison of $^{131}$I activity measurements, Anuradha R., Leena Joseph, D.B. Kulkarni, Suresh Rao and D.N. Sharma, Journal of Medical Physics, vol. 32/suppl/2007, pg S22<br>3. Standardization of $^{134}$Cs , Leena Joseph, Anuradha R., Kulkarni D.B., National Symposium on Radiation Physics (NSRP-17), 14-16 Nov 2007, Kolkata.<br>4. Standardization of Silver-110m at BARC, India, Leena Joseph, R. Anuradha, D.B. Kulkarni, V.V. Shaha, Mapan- Journal of Metrology Society of India, No. 4, 2007, 225. |
| IN PROGRESS | 1. Bilateral comparison of activity measurements of $^{32}$P with NMIJ<br>2. Standardization of $^{57}$Co under IAEA CRP frame work<br>3. Calibration of dose calibrators for NMCs<br>4. Audit programme for $^{99m}$ Tc activity measurements with dose calibrators in NMCs |
| INFORMATION | |
| ADDRESS | Head , Radiation Standards Section, Radiation Safety Systems Division, BARC, Mumbai - 400 085, India<br>Telephone : 0091(22) 25595075 Telefax : 0091(22) 5505151, 5519613<br>E-mail : suresh@barc.gov.in |
| CONTACT | Suresh Rao |

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| LABORATORY | National Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology (NMIJ/AIST) |
| NAMES | Yoshio HINO, Akira YUNOKI, Yasushi SATO and Yasuhiro UNNO |
| ACTIVITY | Calibrations of activity by using the following 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. |
| KEYWORDS | CCRI, APMP, SIR, simulation code, e-trace, source preparation |
| RESULTS | (1) A remote calibration service of activity has started. Several certification reports were issued.<br>(2) Bilateral base comparison with BARC measuring the activity of $^{32}$P.<br>(3) APMP comparison (APMP.RI(II)-K2.Ba-133) for the activity measurements of Ba-133. The report is under preparation. |
| PUBLICATIONS | (1) Y. Hino and T. Kurosawa, "Traceability of radiation protection instruments", Metrologia, 44, pp. S146-S152, 2007.<br>(2) Y. Sato. T. Yamada. H. Hata. K. Morivama. A. Yunoki and Y. Hino, ”The detection efficiency variation method for 4pβ-γ coincidence counting using an ink-jet printer ” ICRM2007, to be published in the Applied Rad. and Isotopes.<br>(3) A. Yunoki, T. Yamada, Y. Sato, Y. Kawada and Y. Hino, ”Calibration of $^{55}$Fe activity with a lithium drifted silicon detector” ICRM2007, to be published in the Applied Rad. and Isotopes. |
| IN PROGRESS | (1) Application of IC tags (RFID) to a remote calibration system for assuring a quality of calibration at a user’s facility.<br>(2) Fabrication of wide-range surface emission sources on aluminium plates by an ink jet printer with an adjustable stage. |
| INFORMATION | -- |
| SOURCE IN PREPARATION | Surface emission sources by an ink jet printer. |
| OTHER RELATED PUBLICATIONS | -- |
| ADDRESS | Radioactivity and Neutron Standardization Section, Quantum Radiation Division, AIST Tsukuba central-2 1-1-1 Umezono, Tsukuba, Ibaraki, 305-8568 JAPAN.<br>Tel : (+81) 29 861 3470, Fax : (+81) 29 861 5673<br>E-mail : a.yunoki@aist.go.jp, Web : http://www.aist.go.jp |
| CONTACT | Akira Yunoki |

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| LABORATORY | Laboratory of Radioactive Standards, RC POLATOM, IAE |
| NAMES | Ryszard BRODA |
| ACTIVITY | Technical expert during 7 accreditation audits of calibration laboratories in Poland. Participation in 19$^{th}$ Meeting of CCRI(II) and in 16$^{th}$ ICRM Conference |
| KEYWORDS | Coincidence method, liquid scintillation, traceability. |
| RESULTS | Observation, that the Polya distribution fits well the global distribution of photons collected by photomultipliers of the LS-detector in the case of low-energy emitters $^{3}$H and $^{55}$Fe. |
| PUBLICATIONS | R. Broda, P. Cassette, K. Kossert. Radionuclide metrology using liquid scintillation counting. Metrologia Special Issue, 44 (2007) 36-52.<br>R. Broda. Some remarks on photon statistics in the LS-counter. (ICRM 2007, accepted for publication in Appl. Radiat. Isot.). |
| IN PROGRESS | Application for accreditation the Laboratory of Radioactive Standards by Polish Center for Accreditation. |
| INFORMATION | The Radioisotope Centre POLATOM has been incorporated in the Institute of Atomic Energy since January the 1$^{st}$, 2007. |
| SOURCE IN PREPARATION | R. Broda, T. Dziel, A. Muklanowicz, A. Listkowska. Intercomparison of $^{99m}$Tc and $^{131}$I by radionuclide calibrators in Polish hospitals, 2007. |
| ADDRESS | Radioisotope Centre POLATOM, Institute of Atomic Energy,<br>05-400 Otwock-Swierk, Poland, e-mail: r.broda@polatom.pl<br>tel.: (48 22) 718 07 21 fax: (+48 22) 718 03 50 |
| CONTACT | Ryszard Broda |

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| LABORATORY | Institutul National de C&D pentru Fizica si Inginerie Nucleara « Horia Hulubei » IFIN-HH<br>Radionuclide Metrology Laboratory |
| NAMES | M.Sahagia, A.C.Razdolescu, C. Ivan, A. Luca |
| ACTIVITY | - New calibration of the Ionisation chamber CENTRONIC IG12/20A for I-131 with the solution sent in the frame of SIR K1 comparison 2007;<br>- A I-131 national comparison was organized in the frame of the IAEA-CRP. E 2.10.05, Contract.12921.<br>- Metrological check of radioiosotope calibrators<br>- QS implementation in the Radionuclide Metrology Laboratory (see the other files) |
| KEYWORDS | Ionisation chamber, radionuclide by name: I-131 |
| RESULTS | IAEA $^{131}$I comparison result, 2006, was presented at ICRM 2007 by Brian Zimmerman.<br>Evaluation by the national accreditation body, RENAR |
| PUBLICATIONS | M.Sahagia, A.C.Razdolescu "Quality assurance in nuclear medicine radioactivity measurements" Rom. Rep. in Phys., Vol 59, 4 (2007) 1119-1126 |
| IN PROGRESS | According to the IAEA contract:(i) IAEA, SSDL comparison for $^{57}$Co (ii) $^{99m}$Tc national comparison |
| INFORMATION | |
| SOURCE IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | Atomistilor Str.407, Magurele, Ilfov County, POB. MG 6, Code 077125, Romania<br>Tel +40214042300/4517, Fax +40214574432, +40214574440,<br>E-mail<msahagia@ifin.nipne.ro> |
| CONTACT | Dr. Maria Sahagia |

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| LABORATORY | Institutul National de C&D pentru Fizica si Inginerie Nucleara « Horia Hulubei » IFIN-HH<br>Radionuclide Metrology Laboratory |
| NAMES | M.Sahagia, A.C.Razdolescu, C.Ivan |
| ACTIVITY | $^{131}$I ( BIPM,RI(II)- K1 Comparison)<br>$^{124}$Sb- EURAMET Project 907<br>QS implementation in the Radionuclide Metrology Laboratory |
| KEYWORDS | Coincidence method , Euramet, SIR,<br>Radionuclide by name ( I-131; Sb-124) |
| RESULTS | $^{131}$I result was evaluated at BIPM; $^{124}$Sb, under evaluation |
| PUBLICATIONS | M.Sahagia, A.C.Razdolescu, A.Luca, C.Ivan "Assurance of the traceability chain for I-131 measurement" Appl. Radiat. Isot. 6,4(2008)539-544<br>M. Woods, M.Sahagia "The international framework for maintaining equivalence and traceability in radionuclide metrology", 1-st International Workshop Nuclear – Proficiency Testing 2007", Bucharest, IFIN-HH, Invited paper<br>M.Sahagia, M.Woods "The national dissemination of international measurements" 1-st International Workshop Nuclear – Proficiency Testing 2007", Bucharest, IFIN-HH, Invited paper<br>M. Sahagia, A. C. Razdolescu, A. Luca, C. Ivan "Importance of the Primary Radioactivity Standard Laboratory and Implementation of its Quality Management" American Institute of Physics, AIP Proc.899 (2007)523-524 |
| IN PROGRESS | - $^{124}$Sb under evaluation, Euromet 907 Project.<br>- A new coincidence system, constructed already, is under testing ; it is aimed to partially replace the old one and to upgrade it by automatic operation, collection and processing of data |
| SOURCE IN PREPARATION | M. Sahagia, C. Ivan, E.L.Grigorescu, Anamaria Cristina Razdolescu "Standardization of $^{125}$I by the Coincidence Method and Practical Applications" ICRM 2007 Conf. Appl. Radiat. Isot. 2008, ARI 3986 |
| OTHER RELATED PUBLICATIONS | M.Sahagia, A.C.Razdolescu, E.L.Grigorescu, A.Luca, C.Ivan , "The collaboration of the Radionuclide Metrology Laboratory from IFIN-HH, owner of the primary activity standard, with units involved in nuclear energy field" Rom. Rep. in Phys, vol.59 , 3 (2007) 787-793<br>M.Sahagia, A.C.Razdolescu, E.L.Grigorescu, A.Luca, C.Ivan " From international equivalence to national traceability in radionuclide metrology", PT Conf, 1-st Proficiency Testing Conference, Sinaia, Romania, 2007, Proceedings, pp.253 – 261 , ISBN 978-973-8123-65-8 |
| ADDRESS | Atomistilor Str.407, Magurele, Ilfov County, POB. MG 6, Code 077125, Romania<br>Tel +40214046163, Fax +40214574432, +40214574440,<br>E-mail<msahagia@ifin.nipne.ro> |
| CONTACT | Dr. Maria Sahagia |

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| LABORATORY | Institutul National de C&D pentru Fizica si Inginerie Nucleara « Horia Hulubei » IFIN-HH<br>Radionuclide Metrology Laboratory |
| NAMES | A.C. Razdolescu, P. Cassette, C. Ivan, M. Sahagia |
| ACTIVITY | QS implementation in the Radionuclide Metrology Laboratory:<br>Upgrading the TDCR system:<br>a) Acquisition of new Burle PMT for a new system.<br>b) Acquisition of 6 CPMs for another system.<br>2 papers presented at ICRM07 Cape Town, South Africa. |
| KEYWORDS | Burle PMT, CPM |
| RESULTS | Evaluation for national accreditation, national accreditation body, RENAR |
| PUBLICATIONS | |
| IN PROGRESS | Upgrading of the LSC-TDCR system, by: (i)Use of 6 Channel Photomultipliers tubes (CPM);(ii) Automatic command of operation, collection and processing of data;(iii) Comparison between the new and standard systems |
| INFORMATION | |
| SOURCE IN PREPARATION | In preparation :<br>1. A.C. Razdolescu, Ph. Cassette, M. Sahagia ” Measurement of Fe-55 solution activity by LSC TDCR method”, Appl. Radiat. Isot (2008)ARI[3957]<br>2. C. Ivan, Ph. Cassette, M. Sahagia, “A new LSC-TDCR counter using Channel Photomultiplier tubes”, Appl. Radiat. Isot (2008), ARI[4005] |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | Atomistilor Str.407, Magurele, Ilfov County, POB. MG 6, Code 077125, Romania<br>Tel +40214042300/4517, Fax +40214574432, +40214574440,<br>E-mail<crazdo@nipne.ro> |
| CONTACT | Anamaria Cristina Razdolescu |

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| LABORATORY | Institutul National de C&D pentru Fizica si Inginerie Nucleara « Horia Hulubei » IFIN-HH<br>Radionuclide Metrology Laboratory |
| NAMES | Aurelian Luca |
| ACTIVITY | Evaluation of nuclear decay data |
| KEYWORDS | Euromet, $^{188}$W, $^{236}$U, $^{124}$Sb, $^{234}$Th, $^{228}$Ra |
| RESULTS | -Evaluation of nuclear decay data for $^{236}$U, in the frame of the IAEA CRP "Updated decay data library for actinides". |
| PUBLICATIONS | |
| IN PROGRESS | -Evaluation of nuclear decay data for $^{234}$Th and $^{228}$Ra.<br>-Participation at the EUROMET Project 907: "$^{124}$Sb- Determination of photon emission intensities".<br>-Checking a previous nuclear decay data evaluation of $^{188}$W and propose a paper for publishing, in co-operation with the colleagues from LNHB/CEA.<br>-Participation at the final IAEA CRP ("Updated decay data library for actinides") Meeting, 8-10 October 2008, in Vienna, Austria. |
| INFORMATION | |
| SOURCE IN PREPARATION | Preparation of the Workshop " Radioactive Decay Data Evaluators" (DDEP 2008), Bucharest 12-14 May 2008 |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | 407 Atomistilor St., Magurele, Ilfov County, PO Box MG-6, Code 077125, Romania; phone: +40 21 4046163; Fax: +40 21 4574440; e-mail: aluca@ifin.nipne.ro |
| CONTACT | Dr. Aurelian Luca |

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| LABORATORY | Institutul National de C&D pentru Fizica si Inginerie Nucleara « Horia Hulubei » IFIN-HH<br>Radionuclide Metrology Laboratory |
| NAMES | Aurelian Luca and Constantin Ivan |
| ACTIVITY | Gamma-ray spectrometry |
| KEYWORDS | Euromet, gamma-ray spectrometry, TENORM, X-ray spectrometry, $^{124}$Sb. |
| RESULTS | -Participation at the IAEA-CU-2007-06-CCRI(II)-S5 supplementary comparison for the determination of technically enhanced naturally occurring radionuclides (TENORM) in phosphogypsum.<br>Testing and preliminary calibration of a new gamma-ray spectrometric system with a HP Ge detector; testing of a new X-ray spectrometry system with a Si(Li) detector.<br>-Activity measurements for different types of samples: environmental, wastes; radionuclidic purity of radiopharmaceuticals; tightness control of industrial radioactive sources. |
| PUBLICATIONS | |
| IN PROGRESS | -Participation at the EUROMET Project 907: "$^{124}$Sb- Determination of photon emission intensities".<br>-Installing a composed shield (lead, tin, copper) for the new HP Ge detector included in the gamma-ray spectrometry system. |
| INFORMATION | |
| SOURCE IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | -Report on the IAEA-CU-2006-03 World-Wide Open Proficiency Test on the Determination of Gamma Emitting Radionuclides, IAEA/AL/171, Seibersdorf, May 2007. |
| ADDRESS | 407 Atomistilor St., Magurele, Ilfov County, PO Box MG-6, Code 077125, Romania; phone: +40 21 4046163; Fax: +40 21 4574440; e-mail: aluca@ifin.nipne.ro |
| CONTACT | Dr. Aurelian Luca |

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| LABORATORY | D.I. Mendeleyev Institute for Metrology (VNIIM) |
| NAMES | I.A. Kharitonov, N.I. Karmalitsyn A.V. Zanevsky, S.V. Sepman, E.E. Terechtchenko, I.A. Sokolova, V.N. Motornaya, T.I. Shilnikova |
| ACTIVITY | Standardization of radionuclide solutions, point, surface and volume reference sources.<br>$4\pi\beta$(PC)-$\gamma$(NaI(Tl)) and KX(0.1mm NaI(Tl))-$\gamma$(NaI(Tl))-coincidence counting systems,<br>$4\pi\beta$(PC)- and $4\pi\alpha$(PC)-counting system,<br>$4\pi\gamma$(NaI(Tl))-counting system,<br>Defined solid angle $\alpha$-counting system,<br>calibrated gamma- and X-ray spectrometers. |
| KEYWORDS | coincidence method, define solid angle (ASD) measurement, gamma-ray spectrometry, gas proportional counter |
| RESULTS | Carrying out the COOMET.RI(II)-K2.Am-241 key comparison of activity concentration measurements of $^{241}$Am<br>Carrying out the COOMET.RI(II)-K2.Cs-137 key comparison of activity concentration measurements of $^{137}$Cs |
| PUBLICATIONS | I.A.Kharitonov, A.V.Zanevsky, V.Milevski, A.Ivaniukovich, P.Oropesa and Y.Moreno "Measurement of the activity concentration of the radionuclide Am-241 in a solution" Metrologia 44 Technical Supplement (Technical Supplement 2007) 06001<br>Experience In Determining Cascade Summation Coefficients Of Gamma-Quanta For Semiconductor Detectors At Vniim In The Range Of 59 To 2754 keV. E. Tereshchenko, M. Rasko. Izmer.Tekh. 9, 2006<br>Standardization of $^{125}$I at VNIIM. E. Tereshchenko, M. Rasko, A. Zanevsky. Izmer.Tekh. 6, 2006, pp. 56-59 |
| IN PROGRESS | |
| INFORMATION | |
| SOURCE IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | VNIIM, 19 Moskovsky pr., St. Petersburg 198005, Russia<br>Phone: (812) 323-96-12<br>Fax: (812) 113-01-14<br>E-mail: info2101@vniim.ru<br>http://www.vniim.ru/ |
| CONTACT | I.A. Kharitonov |

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| LABORATORY | Slovak Institute of Metrology |
| NAMES | Jozef Dobrovodský, Robert Hinca, Lucia Pernická, Ivana Praženicová, Anton Švec |
| ACTIVITY | Calibrations of ionization chambers, large area sources and contamination monitors, gamma-ray spectrometry, illicit traffic radiation monitors, releases of contaminated materials and effluents into environment |
| KEYWORDS | Large area alpha and beta source measurements, environmental control, gamma-ray spectrometry, ionisation chamber, life sciences, liquid scintillation |
| RESULTS | Efficiency curves of ionization chambers, HPGe detectors, large area alpha and beta radiation detectors, testing of radiation monitors |
| PUBLICATIONS | Švec A.: Analytical efficiency curve for coaxial germanium detectors. 16th International Conference on Radionuclide Metrology and its Applications ICRM 2007. Sept.3 – 7, 2007, Cape Town, South Africa |
| IN PROGRESS | Liquid scintillation counter purchase and the method introduction |
| INFORMATION | |
| SOURCE IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | Švec A.: Germanium detector as a true activity meter. GS WG, Sep.4, 2007<br>Paepen J., Švec A., Camps J., Van Ammel R., Pommé S., Wäetjen U.: A prototype of a calibrating radiation source for installed radiation monitors. The IRPA Regional Congress for Central and Eastern Europe. Sept.24 – 28, 2007, Brasov, Romania.<br>Švec A.: Future of the future SIR ionization chamber. BqWG, Dec.5, 2007 |
| ADDRESS | Slovak Institute of Metrology, Center for Ionizing Radiations, Karloveská 63, 842 55 Bratislava<br>Tel.: +421 2 60294 671, Fax.: +421 2 60294 670<br>e-mail: dobrovodsky@smu.gov.sk, svec@smu.gov.sk |
| CONTACT | Jozef Dobrovodský, Director of the Center |

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| LABORATORY | Laboratory for Radiological Measurement Systems and Radioactivity Measurements, Jozef Stefan Institute, Ljubljana, Slovenia |
| NAMES | M. Korun, T. Vidmar, B. Vodenik, D. Glavic-Cindro |
| ACTIVITY | |
| KEYWORDS | Gamma-ray spectrometry, Beta spectrometry, Environmental measurements |
| RESULTS | - International intercomparison exercise on Monte Carlo methods in gamma-ray spectrometry<br>- A method to determine the optimal sampling and counting regimes for water monitoring<br>- A new library-driven approach to the analysis of HPGe spectra based on full-spectrum matching with synthetic spectra of individual radionuclides (collaboration with PTB) |
| PUBLICATIONS | VIDMAR, Tim, KORUN, Matjaz, VODENIK, Branko. A method for calculation of true coincidence summing correction factors for extended sources. Appl. Radiat. Isotopes, 2007, vol. 65, pp. 243-246.<br><br>GLAVIC-CINDRO, Denis, KORUN, Matjaz, VODENIK, Branko. Reliability of the automatic gamma-ray spectrum analysis procedure for results near the detection limit. J. Radioanal. Nucl. Chem., 2007, vol. 271, pp. 467-473. |
| IN PROGRESS | Monte Carlo simulations in gamma-ray spectrometry for Lu-176 half-life determination with the sum-peak method, collaboration with PTB. |
| INFORMATION | |
| SOURCE IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | Jozef Stefan Institute, Jamova cesta 39, SI-1000 Ljubljana, Slovenia |
| CONTACT | Tim.Vidmar@ijs.si |

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| LABORATORY | National Metrology Institute of South Africa (NMISA) (SA1/SA2) |
| NAMES | Bruce Simpson, Freda van Wyngaardt |
| ACTIVITY | **Activities undertaken in 2007**<br>• Participated in and made presentations at both the ICRM Liquid Scintillation Counting Working Group and the Life Sciences WG meetings held in Paris, France in January 2007.<br>• Submitted to the SIR a sample of $^{22}$Na measured by the $4\pi[LS]\beta^{+}$-$\gamma$ coincidence counting technique.<br>• Reviewed on request two papers submitted to a journal for publication.<br>• Completed a study on activity measurement of dual mixtures of pure beta-emitting radionuclides by a simple counting technique.<br>• Reviewed all abstracts submitted for inclusion in the ICRM 2007 conference programme. Attended the ICRM Scientific Committee/EB meeting held at Ispra, Italy during March.<br>• Attended the CCRI(II) and CCRI meetings at the BIPM in May.<br>• Contributed to the organisation of the Metrologia Special Issue on radionuclide metrology, refereed one of the papers and co-authored the Foreword.<br>• Reviewed radioactivity CMCs submitted by various national laboratories on behalf of the SADCMET region.<br>• The Radioactivity Standards laboratory successfully underwent its 2$^{nd}$ three-yearly international assessment for accreditation purposes in July.<br>• Refereed papers in the area of liquid scintillation counting accepted for the ICRM 2007 conference.<br>• Organised the arrangements for hosting the ICRM 2007 conference. The conference was succesfully held in Cape Town during 3-7 September.<br>• Presented two oral presentations at ICRM 2007 and wrote manuscripts on the work for the Proceedings.<br>• Attended the CCRI RMO Working Group meeting on CMCs and two CCRI(II) WG meetings (Key Comparison WG and Uncertainties WG) at the BIPM in Nov/Dec.<br>• Measured $^{35}$S and $^{90}$Y by the TDCR absolute technique for a radioisotope department at a reactor facility. Checked the calibration of a new radionuclide calibrator at a particle accelerator faclity.<br><br>**Programme for 2008**<br>• Undertake a 5-week visit to IRMM, Geel, Belgium and participate in liquid scintillation related projects (FvW).<br>• Participate in the $^{3}$H activity key comparison being planned for this year.<br>• Update all quality management system procedures pertaining to the radioactivity laboratory.<br>• Submit additional radioactivity CMCs for intra- and inter-regional review.<br>• Undertake absolute standardizations of $^{99m}$Tc and $^{18}$F by liquid scintillation coincidence counting and establish calibration factors for the NMISA ionization chamber.<br>• Participate in the Liquid Scintillation Spectrometry Conference (LSC 2008) being held at Davos, Switzerland in May.<br>• Participate in the CCRI(II) Comparison/Uncertainties Workshop being held at the BIPM in September.<br>• Submit an abstract(s) to the ICRM 2009 conference Scientific Secretariat for consideration by the scientific committee. |

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| | • Continue with the commissioning of a new HPGe detector and Digital Spectrum Analyzer.<br>• Provide radioactivity measurement services to the user community. |
| KEYWORDS | coincidence method, activity measurement, ionisation chamber, life sciences, liquid scintillation, gamma-ray spectrometry, SIR, 22Na, 35S, 90Y, 133Ba, 3H, 99mTc, 18F |
| PUBLICATIONS | Bruce Simpson and Steven Judge, FOREWORD for the Metrologia Special issue on radionuclide metrology. Metrologia 44 (2007).<br><br>W.M. Van Wyngaardt, B.R.S. Simpson and G.E. Jackson, *Further investigations of a simple counting technique for measuring mixtures of two pure b-emitting radionuclides*. ICRM 2007 proceedings (to be published).<br><br>B.R.S. Simpson and W.M. Van Wyngaardt, *Absolute activity of $^{133}$Ba by liquid scintillation coincidence counting using the 4p(e,X)-g extrapolation technique*. ICRM 2007 proceedings (to be published). |
| IN PROGRESS | W.M. Van Wyngaardt and B.R.S. Simpson, *Standardization of S-35 by the TDCR efficiency calculation technique*. Accepted for poster presentation at the Liquid Scintillation Spectrometry Conference (LSC 2008) being held in Davos, Switzerland during May 2008. |
| INFORMATION | Formerly the CSIR National Metrology Laboratory, the NMISA was established on 1 May 2007, falling within the South African Dept. of Trade and Industry Group (http://www.thedti.gov.za/thedti/NMISA.htm). |
| ADDRESS | Radioactivity Standards Laboratory, NMISA<br>15 Lower Hope Road, Rosebank 7700<br>Cape Town, SOUTH AFRICA |
| CONTACT | B.R.S. Simpson<br>Tel./fax (office) +27 21 686 2759, Tel. (lab) +27 21 685 4325<br>E-mail : bsimpson@nmisa.org |

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| LABORATORY | Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT |
| NAMES | Eduardo García-Toraño, Virginia Peyrés Medina |
| ACTIVITY | Standardization of positron emitters by $4\pi\gamma$ counting |
| KEYWORDS | NaI well-type counters |
| RESULTS | Standardization of $^{22}$Na and $^{18}$F and comparison to coincidence and LSC methods |
| PUBLICATIONS | E. García-Toraño, V. Peyres, M. Roteta, "On the standardization of positron emitters by $4\pi\gamma$ counting", Nuclear Inst. and Methods A, 570 (2007) 84-88. |
| IN PROGRESS | New method for the determination of critical parameters of the NaI well detector to be used in Monte Carlo simulations |
| INFORMATION | |
| SOURCE IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | CIEMAT, Ed. 12 Avenida Complutense s/n, 28040 Madrid, Spain.<br>Tel: +34 91 346 6225, FAX: +34 91 346 6442 |
| CONTACT | Eduardo García-Toraño, e.garciatorano@ciemat.es |

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| LABORATORY | Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT |
| NAMES | Eduardo García-Toraño, Teresa Durán Ramiro |
| ACTIVITY | Standardization of sources of alpha-particle emitters by Defined Solid Angle Counting |
| KEYWORDS | NaI well-type counters |
| RESULTS | Standardization of sources of $^{233}U$ as a part of an international cooperation project coordinated by IRMM (partners PTB, LNHB, NPL and CIEMAT) |
| PUBLICATIONS | |
| IN PROGRESS | Final data analysis to provide new values for $T_{1/2}$ of $^{233}U$ ( S. Pommé, IRMM, coordinator) |
| INFORMATION | |
| SOURCE IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | Defined solid angle counter with variable geometry, Applied Radiation and Isotopes (2008), doi:10.1016/j.apradiso.2008.02.040 |
| ADDRESS | CIEMAT, Ed. 12 Avenida Complutense s/n, 28040 Madrid, Spain<br>Tel: +34 91 346 6225, FAX: +34 91 346 6442 |
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| LABORATORY | Laboratorio de Metrología de Radiaciones Ionizantes (CIEMAT) |
| NAMES | Virginia Peyrés Medina, Eduardo García-Toraño |
| ACTIVITY | Monte Carlo simulation for efficiency calibration of a Ge detector. |
| KEYWORDS | Gamma-ray spectrometry, Monte Carlo simulation |
| RESULTS | Efficiency calibration of an extended-range Ge detector by Monte Carlo simulation in an energy range from 14 to 1800 keV. Discrepancies between simulation and experimental values are within 1 standard deviation. |
| PUBLICATIONS | V. Peyres, E. García-Toraño, “Efficiency calibration of an extended-range Ge detector by a detailed Monte Carlo simulation”. Nucl. Instr. And Meth. A 580 (2007) 296-297. |
| IN PROGRESS | |
| INFORMATION | |
| SOURCE IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | CIEMAT, Ed. 12 Avenida Complutense s/n, 28040 Madrid, Spain<br>Tel: +34 91 346 6226, FAX: +34 91 346 6442 |
| CONTACT | Virginia Peyres virginia.peyres@ciemat.es |

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| LABORATORY | Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT |
| NAMES | Teresa Durán Ramiro, Eduardo García-Toraño |
| ACTIVITY | Design of a LSC counter based on an Hybrid Photomultiplier |
| KEYWORDS | liquid scintillation |
| RESULTS | Prototype of a new LSC system with improved energy resolution (1%) for sources of alpha emitters in standard LSC vials |
| PUBLICATIONS | M.T. Durán, E. García-Toraño (2007) "Optimization of the reflector design in a liquid scintillation counter with one photodetector". In "LSC 2005, Proceedings of the 2005 International Liquid Scintillation Counting, Katowice, Poland". Radiocarbon, (S. Chalupnik, F. Schönhofer and J. Noakes editors). |
| IN PROGRESS | |
| INFORMATION | |
| SOURCE IN PREPARATION | M.T. Durán, E. García-Toraño, "A Liquid Scintillation Counter with Enhanced Energy Resolution Based on an Hybrid Photomultiplier " to be sent for publication to NIMA |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | CIEMAT, Ed. 12 Avenida Complutense s/n, 28040 Madrid, Spain<br>Tel: +34 91 346 6225, FAX: +34 91 346 6442 |
| CONTACT | Teresa Durán Ramiro, Teresa.duran@ciemat.es<br>Eduardo García-Toraño, e.garciatorano@ciemat.es |

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| LABORATORY | Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT |
| NAMES | Miguel Roteta Ibarra |
| ACTIVITY | $4\pi\beta-\gamma$ Coincidence Measurements with pressurised proportional counters |
| KEYWORDS | coincidence method |
| RESULTS | |
| PUBLICATIONS | |
| IN PROGRESS | Setup of a digital acquisition system with two channels, similar to the one existing at KRISS. Development of software to analyze data, including correlations. The acquisition system will be connected to the existing equipment (pressurized proportional counter, NaI detector) |
| INFORMATION | |
| SOURCE IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | CIEMAT, Ed. 12 Avenida Complutense s/n, 28040 Madrid, Spain<br>Tel: +34 91 346 6244, FAX: +34 91 346 6442 |
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| LABORATORY | Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT |
| NAMES | Eduardo García-Toraño |
| ACTIVITY | Measurement of the alpha-particle emission probability of $^{240}$Pu (EURAMET project nr. 749 coordinated by IRMM) |
| KEYWORDS | Alpha spectrometry |
| RESULTS | Measurements finished at CIEMAT with a temperature-stabilized alpha chamber and Implanted Si detectors. Preliminary fittings done. |
| PUBLICATIONS | |
| IN PROGRESS | Final analysis of data obtained by all participants (G.Sibbens, IRMM, project coordinator) |
| INFORMATION | |
| SOURCE IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | CIEMAT, Ed. 12 Avenida Complutense s/n, 28040 Madrid, Spain<br>Tel: +34 91 346 6225, FAX: +34 91 346 6442 |
| CONTACT | Eduardo García-Toraño, e.garciatorano@ciemat.es |

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| LABORATORY | Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT |
| NAMES | M. GALAN, J.M. LOS ARCOS |
| ACTIVITY | Decay data evaluations, maintenance and update of the Spanish National Database for Ionizing Radiation (BANDRRI) |
| KEYWORDS | Data evaluation, $^{133}$Xe, $^{133m}$Xe, $^{133}$I |
| RESULTS | Participation in the DDEP training session<br>Completed evaluations for DDEP: $^{133}$Xe, $^{133m}$Xe and $^{133}$I |
| PUBLICATIONS | The completed evaluations have been already published in: http://www.nucleide.org/DDEP_WG/DDEPdata.htm |
| IN PROGRESS | Evaluations of $^{135m}$Xe, $^{22}$Na, $^{59}$Ni, $^{94}$Nb |
| INFORMATION | |
| SOURCE IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | BANDRRI web site:<br>http://www.ciemat.es/portal.do?TR=C&IDR=1280 |
| ADDRESS | Laboratorio de Metrología de Radiaciones Ionizantes, CIEMAT. Av. Complutense, 22. 28040 Madrid, Spain.<br>E-mail: Monica.galan@ciemat.es<br>Phone: +34 91 346 6222 Fax: +34 91 346 6772 |
| CONTACT | Monica Galan |

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| LABORATORY | IRA |
| NAMES | Claude Bailat, Youcef Nedjadi, Philippe Spring |
| ACTIVITY | Source preparation, coincidence method, gas proportional counter, NaI well counter, liquid scintillation, alpha spectrometry, gamma-ray spectrometry, ionisation chamber, Monte Carlo simulation, Radon measurements. |
| RESULTS | Organised a national gamma spectrometry intercomparison for the measurement of the activity of Sb-124.<br>Standardization of Sb-124 and submission at the Sb-124 international intercomparison |
| PUBLICATIONS | Nedjadi Y., Spring Ph., Bailat C., Decombaz M., Triscone G., Gostely J.-J., Laedermann J.-P., Bochud F, Primary activity measurements with 4πγ NaI(Tl) counting and Monte Carlo calculated efficiencies, Applied Radiation and Isotopes 65 (2007) 534-538.<br>Nedjadi Youcef, Spring Philippe, Zufferey Sandrine, Valley Jean-François, Bochud François O.International Key Comparison of Activity Measurements of 54Mn, MetINFO 1/2006.<br>François Bochud, Claude J. Bailat, Thierry Buchillier, François Byrde, Ernst Schmid and Jean-Pascal Laedermann, Simple Monte-Carlo method to calibrate well-type HPGe detectors, Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment, Volume 569, Issue 3, 21 December 2006, Pages 790-795<br>Philippe Spring, Youcef Nedjadi, Claude Bailat, Gilles Triscone, François O Bochud, Absolute Activity Measurement of Radon Gas at IRA-METAS, Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment, Volume 568, Issue 2, 1 December 2006, Pages 752-759.<br>Bochud F. O., Bailat C. J., Laedermann J.-P. Bayesian statistics in radionuclide metrology: Measurement of a decaying source, Metrologia 44 (2007) S95-S101.<br>Youcef Nedjadi, Philippe Spring, Claude Bailat, P. Froidevaux, C. Wastiel, and François Bochud, Purification and Activity Standardisation of Ho-166m Solution, JARI, in press. |
| IN PROGRESS | Validating the TDCR method; Validating the 4πβ-4πγ coincidence method; Measuring the period of Ho-166m and replacing the reference sources for the Swiss reference ionisation chamber; Characterising a HPGe well-detector for Monte Carlo simulation. |
| INFORMATION | |
| SOURCE IN PREPARATION | Ho-166m |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | Institut Universitaire de Radiophysique Appliquée<br>Grand-Pré 1<br>CH-1007 Lausanne<br>Switzerland<br>Tel : +41 21 6233434<br>Fax : +41 21 6233435<br>http://www.chuv.ch/public/instituts/ira |
| CONTACT | Claude Bailat |

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| LABORATORY | National Radiation Standard Laboratory, Institute of Nuclear Energy Research (NRSL/INER) |
| NAMES | Ming-Chen Yuan, Chien-Yung Yeh, and Ing-Jane Chen |
| ACTIVITY | 1. Standardized In-111 and recalibrated the $4\pi\gamma$ ionization chambers.<br>2. Studied calibration techniques of the drum counting system for the nuclear waste decommissioning..<br>3. Set up a new $2\pi\alpha/\beta$ counting system. |
| KEYWORDS | coincidence method, environmental control, gas proportional counter, ionisation chamber, life sciences, In-111 |
| RESULTS | INER participated in the APMP.RI(II)-K2.Cs-134 comparison. The results were published in the BIPM KCDB. |
| PUBLICATIONS | 1. M.C. Yuan, I. J. Chen, C. F. Wang, "Primary standardization of $^{67}$Ga Radiopharmaceuticals", 16$^{th}$ International Conference on Radionuclide Metrology and its Applications, Cape Town, South Africa (September 3-7, 2007) |
| IN PROGRESS | 1. Participating in APMP I-131 key comparison piloted by NMIJ/Japan. |
| INFORMATION | |
| SOURCE IN PREPARATION | |
| OTHER RELATED PUBLICATIONS | |
| ADDRESS | Health Physics Division,<br>Institute of Nuclear Energy Research<br>No.1000, Wunhua Rd., Jiaan Village, Longtan Township, Taoyuan County, 32546, Taiwan (R.O.C.) |
| CONTACT | Ming-Chen Yuan (E-mail:mcyuan@iner.gov.tw) |

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| LABORATORY | National Physical Laboratory |
| NAMES | Arzu Arinc, Lena Johansson, John Sephton, Eleanor Bakshandeiar, Andy Pearce |
| APPARATUS | Liquid Scintillation Counting |
| RESULTS | Radionuclide solutions of $^{14}C$, $^{35}S$, $^{55}Fe$, $^{90}Sr$, $^{90}Y$, $^{99}Tc$, $^{93m}Nb$, $^{129}I$, $^{147}Nd/^{147}Pm$ standardised by CIEMAT/NIST. New Quantulus low level liquid scintillation counter installed. |
| IN PROGRESS | Development of the NPL TDCR counting system.<br><br>Development of a second $4\pi$(LS)-$\gamma$ coincidence counting counter for standardising radionuclides.<br><br>Investigation of the assumption of 100 % detection efficiency for alpha emitting radionuclides in liquid scintillation counting.<br><br>Validation and characterisation of two commercial liquid scintillation counters.<br><br>Investigation of the ionisation quench effect in liquid scintillators. Standardisation of $^{64}Cu$. |
| ADDRESS | Hampton Road, Teddington, Middlesex, United Kingdom, TW11 0LW<br>Tel.: +44 208 943 6699<br>E-mail: arzu.arinc@npl.co.uk |
| CONTACT | Arzu Arinc |

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| LABORATORY | National Physical Laboratory |
| NAMES | Sean Collins, Andy Pearce |
| APPARATUS | High Resolution Gamma Spectrometers |
| RESULTS | The NPL high resolution gamma spectrometry facilities have been redesigned to improve the reproducibility of positioning.<br><br>New optical benches featuring kinematic mounts which control movement in three dimensions have been installed.<br><br>A new calibration geometry for $4\pi$ sources has been included to facilitate gamma emission probability measurements. |
| IN PROGRESS | Measurement of the Gamma Emission Probabilities of Silver-111.<br><br>Complete recalibration of two detector systems. |
| ADDRESS | Hampton Road, Teddington, Middlesex, United Kingdom, TW11 0LW<br>Tel.: +44 208 943 6699<br>E-mail: andy.pearce@npl.co.uk |
| CONTACT | Andy Pearce |

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| LABORATORY | National Physical Laboratory |
| NAMES | Hilary Phillips, Julian Dean, Maria Marouli |
| ACTIVITY | Standardisation of radioactive gases by internal proportional counting |
| RESULTS | Modelling of proportional counters' response to positron emitters ($^{11}$C, $^{13}$N, $^{15}$O and $^{18}$F) in gas<br>Measurement of $^{11}$C in gas by internal proportional counting |
| PUBLICATIONS | Marouli, M., Dean, J. C. J. and Spyrou, N. M. 'Feasibility of using proportional gas counters as a primary standard for positron emitters in gas', Nucl. Instrum. Methods. Phys. Res. A, 580(1), 660 (2007). |
| IN PROGRESS | ▪ Incorporation of energy calibrated MCA into counting system to enable evaluation of counting losses and help validate $^{11}$C model<br>▪ Development of quality control counter for $^{3}$H system<br>▪ use of correlation counting for examination of after-pulses.<br>Participation in BIPM $^{85}$Kr comparison exercise. |
| ADDRESS | Hampton Road, Teddington, Middlesex, United Kingdom, TW11 0LW<br>Tel.: +44 208 943 6775<br>E-mail: hilary.phillips@npl.co.uk |
| CONTACT | Hilary Phillips |

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| LABORATORY | National Physical Laboratory |
| NAMES | Chris Gilligan, Simon Jerome, Arzu Arinc, Lena Johansson and Arvic Harms |
| ACTIVITY | • Organisation of laboratory proficiency testing programmes<br>• Provision of low-level standards of radioactivity<br>• Organisation of User Forums |
| KEYWORDS | Alpha spectrometry, (anti) coincidence method, gamma-ray spectrometry, ionisation chamber, liquid scintillation, low-level, radiochemistry, source preparation, traceability, $^{3}$H, $^{14}$C, $^{36}$Cl , $^{40}$K, $^{41}$Ca, $^{55}$Fe, $^{60}$Co, $^{63}$Ni, $^{89}$Sr, $^{90}$Sr, $^{95}$Zr, $^{95}$Nb, $^{99}$Tc, $^{125}$Sb, $^{129}$I, $^{133}$Ba, $^{134}$Cs, $^{137}$Cs, $^{144}$Ce, $^{152}$Eu, $^{154}$Eu, $^{155}$Eu, $^{208}$Po, $^{210}$Pb, $^{226}$Ra, $^{228}$Ra, $^{232}$U, $^{237}$Np, $^{238}$U, $^{238}$Pu, $^{239}$Pu, $^{241}$Am, $^{243}$Am and $^{244}$Cm. |
| RESULTS | • Organisation of the NPL Environmental Radioactivity Proficiency Test Exercise 2007 (65 participants; eight sample types (aqueous and solid); nuclides included $^{3}$H, $^{14}$C, $^{36}$Cl, $^{40}$K, $^{41}$Ca, $^{55}$Fe, $^{60}$Co, $^{63}$Ni, $^{89}$Sr, $^{90}$Sr, $^{95}$Zr, $^{95}$Nb, $^{99}$Tc, $^{125}$Sb, $^{129}$I, $^{133}$Ba, $^{134}$Cs, $^{137}$Cs, $^{144}$Ce, $^{152}$Eu, $^{154}$Eu, $^{155}$Eu, $^{226}$Ra, $^{228}$Ra, $^{237}$Np, $^{238}$U, $^{238}$Pu, $^{239}$Pu, $^{241}$Am and $^{244}$Cm)<br>• Provision of mixed gamma-emitting nuclides, $^{208}$Po, $^{210}$Pb, $^{232}$U and $^{243}$Am low-level standards<br>• Organisation of two user forums (NSUF May 2007 and LSUF Sept 2007) |
| PUBLICATIONS | Harms, A.V., Dean, J.C.J., Gilligan, C.R.D., Jerome, S.M., 2007. 'The performance of UK and overseas laboratories in proficiency tests for the measurement of $^{241}$Am'. Environmental Radiochemical Analysis III, edited by P. Warwick, The Royal Chemical Society Special Publication 312, pp.200-206. |
| IN PROGRESS | • Organisation of the NPL Environmental Radioactivity Proficiency Test Exercise 2008 and NSUF 2008<br>• UKAS accreditation (ISO Guide 43, part 1; Proficiency Test Exercise Providers)<br>• Provision of low-level standards of radioactivity<br>• Development of environmental radioactivity reference materials<br>• Statistical analysis of the results in NPL Environmental Radioactivity Proficiency Test Exercises 1989-2007<br>Publications on (i) NPL Environmental Radioactivity Proficiency Test Exercise 2007, (ii) $^{95}$Nb/$^{95m}$Nb/$^{95}$Zr ratios, (iii) data treatment Proficiency Test Exercises and (iv) development of irradiated concrete reference material |
| ADDRESS | Hampton Road, Teddington, Middlesex, United Kingdom, TW11 0LW<br>Tel.: +44 208 943 8512<br>E-mail: arvic.harms@npl.co.uk |
| CONTACT | Arvic Harms |

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| LABORATORY | National Physical Laboratory |
| NAMES | Julian Dean, Pete Burgess, Arvic Harms, Simon Jerome, Chris Gilligan |
| ACTIVITY | UK Measurement Infrastructure for Nuclear Decommissioning:<br>• Development of reference materials<br>• Organisation of comparison exercises<br>• Contributions to guidance on radionuclide metrology in site decommissioning |
| KEYWORDS | Gamma-ray spectrometry; ionisation chamber; low-level; radiochemistry. |
| RESULTS | Comparison of gamma-spectrometry systems at UK nuclear sites |
| PUBLICATIONS | Dean, J. C. J., Adsley, I. and Burgess, P. H. 'Traceability for Measurements of Radioactivity in Waste Materials Arising from Nuclear Site Decommissioning.' Metrologia, 44 (2007), S140-S145.<br><br>Dean, J. C. J. 'A Comparison of Procedures Used at UK Nuclear Sites for Gamma Assays of Potentially Contaminated or Activated Materials.' NPL Report IR2, 2007. |
| IN PROGRESS | Second comparison scheduled for 2008 |
| ADDRESS | Hampton Road, Teddington, Middlesex, United Kingdom TW11 0LW<br>Tel: +44 208 943 6278<br>Email: julian.dean@npl.co.uk |
| CONTACT | Julian Dean |

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| LABORATORY | National Physical Laboratory |
| NAMES | John Keightley, Lena Johannson, John Sephton, Andy Stroke, Andy Pearce, Sean Collins. |
| ACTIVITY | • $4\pi\beta$(APPC)–$\gamma$ Coincidence Counting<br>• $4\pi\beta$(HPPC)–$\gamma$ Coincidence Counting<br>• $4\pi\beta$(LS)–$\gamma$ Coincidence Counting<br>• Digital Coincidence Counting (DCC)<br>• Calibration of Wide Area Reference Sources, in terms of surface emission rate. |
| RESULTS | Primary standardisations of : $^{56}$Mn, $^{134}$Cs, $^{124}$Sb.<br><br>New DCC software routines developed for dual-channel correlation counting and Selective Sampling (SESAM), $\beta$–$\gamma$ sum counting. |
| PUBLICATIONS | Keightley, JD and Park, T.S. 'Digital Coincidence Counting for Radionuclide Standardization'. Metrologia, 44 (2007), S32-S35.<br><br>Sephton, J.P, Johannson, L.C. and Williams, J.M. 'A low-noise current sensitive amplifier-discriminator system for beta particle counting'. Presented at ICRM 2007 conference … in print. Appl. Radiat. Isot. |
| IN PROGRESS | Re-design of high pressure proportional counter (HPPC) system, to facilitate $\beta$–$\gamma$ sum counting technique.<br><br>Incorporation of new DCC analysis routines.<br><br>Standardisation of $^{64}$Cu.<br><br>Modernisation of Wide Area Reference Source calibration system. |
| ADDRESS | Hampton Road, Teddington, Middlesex, United Kingdom TW11 0LW<br>Tel: +44 208 943 6278<br>Email: john.keightley@npl.co.uk |
| CONTACT | John Keightley |

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| LABORATORY | National Physical Laboratory |
| NAMES | John Keightley, Eleanor Bakhshandeiar, John Sephton, Keith Lines |
| ACTIVITY | • Upgrade of the NPL Secondary Standard Radionuclide Calibrator (now called Fidelis).<br>• Incorporation of new current measurement system for NPL in-house ionisation chamber systems.<br>• Organisation of radionuclide calibrator measurement comparisons.<br>• Organisation of the Radionuclide Calibrator User Forum, 2007. |
| RESULTS | Comparison of radionuclide calibrator measurements of $^{99m}$Tc in UK Hospitals |
| PUBLICATIONS | Macmahon, D., Townley, J., Bakshandeiar, E. and Harms, A. 'Comparison of radionuclide calibrator measurements of 99mTc in UK Hospitals: 2006'. NPL Report DQL-RN-018 |
| IN PROGRESS | Planned : Lu-177 standardisation, and issue of calibration factors for NPL Secondary Standard Ionisation Chamber systems. |
| ADDRESS | Hampton Road, Teddington, Middlesex, United Kingdom TW11 0LW<br>Tel: +44 208 943 6278<br>Email: john.keightley@npl.co.uk |
| CONTACT | John Keightley |