Metrology (Technical) Working Group 6 – Ionizing Radiation and Radioactivity (MWG 6)

Report of the 2nd Meeting
27 October 2005

to the Inter-American Metrology System (Sistema Interamericano de Metrologia) SIM

Agenda

1. Welcome to the Ionizing Radiation Division (L. Karam)
2. Appointment of a *Rapporteur* (Group)
3. Confirmation of the agenda (Group)
4. Status of CMCs in dosimetry, neutron measurements and radioactivity (L. Karam)
5. Discussed and planned changes to the CMC review process (L. Karam)
6. Discussion of the Generic Groupings for Key Comparisons of Radioactivity (L. Karam, Group)
7. Discussion of potential supporting regional comparisons, existing and planned (Group)
8. Discussion on Chairmanship for Group (Group)
9. Update on laboratory activities in ionizing radiation (Representatives)
    - NRCC, NIST, ININ, LNMRI-IRD, CNEA
    - Status of quality system
    - Participation in comparisons
10. Date and place of next meeting – in 2007 or 2009 (Group)

Abstract

The status of Calibration and Measurement Capabilities (CMCs) for participating National Metrology Institutes (NMIs) were reviewed, as well as planned changes in the CMC review process. Generic groupings of the large number of CMCs in the radioactivity field were presented to permit coverage of these by fewer comparisons among the NMIs. A large number of new comparisons were proposed, and commitments for developing the protocols were made. Lisa Karam of NIST was selected as the Chair of MWG 6. Updates on activities at the various NMIs were presented.

1. Welcome

The second meeting of the Metrology Working Group 6 for Ionizing Radiation and Radioactivity was held at the National Institute of Standards and Technology (NIST) , in Gaithersburg, MD, USA, on 27 October 2005 (the first meeting had been held on 1 November 2001).

The following representatives of National Metrology Institutes of the Americas were present:

NRC Canada	Carl Ross (Dosimetry, Neutron measurements)
NIST USA	Lisa Karam (Acting TG Chair) Marc Desrosiers (Dosimetry) Ronaldo Minniti (Dosimetry) Christopher Soares (Dosimetry) David Gilliam (Neutron measurements) M. Scott Dewey (Neutron measurements) Michael Unterweger (Radioactivity)
CNM-ININ Mexico	Víctor Tovar (Dosimetry, Neutron measurements, Radioactivity)
IRD-LNMRI Brazil	Evaldo Simões da Fonseca (Dosimetry, Neutron measurements) Carlos José da Silva (Neutron measurements, Radioactivity)
CNEA Argentina	Margarita Saravi (Dosimetry) F. Amanda Iglicki (Radioactivity)

The Acting Working Group Chair, Lisa Karam, Deputy Chief of the NIST Ionizing Radiation Division welcomed the representatives and asked each to give a brief self-introduction to the Group.

2. Appointment of a *Rapporteur*

David Gilliam of NIST was appointed as *Rapporteur*.

3. Confirmation of the agenda

The proposed agenda was confirmed without change.

4. Status of CMCs in dosimetry, neutron measurements and radioactivity

Approved Calibration and Measurement Capabilities (CMCs) of signatories to the Mutual Recognition Arrangement (MRA) are posted in Appendix C of the MRA on the web site of the International Bureau of Weights and Measures (BIPM). The status of these CMCs in their progress through the approval process was reviewed by Dr. Karam. A tabulation of the Round-Two Status of SIM CMCs as of 1 October 2005 was distributed (Round-Three Status dated 27 October is included with the attached working documents of this meeting).

Radioactivity
Argentina's CMCs are not currently posted in Appendix C, pending approval of their Quality System.

Mexico's CMC's will be posted by the end of calendar year 2005. They are currently receiving comments from inter-regional review.

Neutrons
All have been approved by all Regional Metrology Organizations (RMOs) except EUROMET. All will soon be posted if EUROMET approves them or makes no response during the 6 week period allowed for comments.

Dosimetry
CMCs for the USA have been approved, and Canada's CMCs are near approval, pending resolution on a question about Canada's Quality System. This question is not expected to be resolved before the end of March 2006.

Changes to the CMCs
All NMIs were asked to send any proposed changes to their CMCs to Lisa Karam, during January of 2006.

5. Discussed and planned changes to the CMC review process

Lisa Karam discussed the Intra-Regional review process in detail. New CMCs must be reviewed by at least one RMO. Such a review usually takes two to three months. Once one NMI has approved the new CMCs and no other NMI raises issues to be resolved within the comment period of 6 weeks, then the new CMCs will be posted in Appendix C.

The following changes have been made for filling in the CMC tables (ref. http://www.bipm.org/utils/common/documents/jcrb/IR_CMC_Rules_2004.pdf):

Columns will be labeled alphabetically rather than numerically.

Column D: Measurand level range, minimum value: Text format will replace Scientific Format.

Column H: Cannot be blank

Column P: Will have an active link to the criteria of acceptance of data for Appendix C. The NMIs may choose which comparisons they cite to support their claims.

Column Q: This column will be visible to the public (customers), and the NMIs are free to provide any additional information of their choosing in this space.

Column U: This will be an archive of comments from reviewers.

6. Discussion of the Generic Groupings for Key Comparisons of Radioactivity

The large number of CMCs for radioactivity requires some groupings of the radionuclides by decay schemes, measurement methods, applications, and decay modes so that needless repetition of common parameter sets can be avoided and so that comparisons do not have to be carried out for such a large number of cases. The attached working documents of this meeting show the generic groupings for primary methods, grouping criteria for supporting CMCs, and list the abbreviations and acronyms used in the tables.

7. Discussion of potential supporting regional comparisons, existing and planned

Dosimetry – lower ranges
R. Minniti reported that NIST is leading the western hemisphere's participation in the EUROMET comparisons of measurements of absorbed dose to water and air kerma by circulating chambers and electronics in a "star shaped" pattern centered at NIST.

V. Tovar seeks a bilateral comparison with NIST on measurement of air kerma by graphite chambers, prior to the EUROMET comparison in 2007. He will send secondary chambers to NIST for the comparison. C. da Silva offered to share Monte Carlo (MC) calculations of wall effects as an aid to this comparison, noting that the LNMRI dosimetry group is making MC calculations of wall effects. He also noted that, if some NMI should be interested in discuss these calculations, they would be welcome to contact him.

M. Saravi agreed to write a protocol for a comparison of air kerma at radiation protection levels. C. Soares said that NIST has x-ray fields appropriate the for internal energy range. NRC (Canada) agreed to participate at dose levels on the order of 30 mGy/minute. Michelle O'Brien would be the NIST point of contact. Dr. Saravi was also interested in personal dose equivalent comparisons, but Dr. Soares said that NIST did not have a Hp(10) standard.

V. Tovar also indicated interest in comparisons of measurements for mammography and brachytherapy.

M. O'Brien will prepare a protocol for a mammography x-ray comparison. Brazil and Mexico indicated interest in participation.

C. Soares will prepare a protocol for a brachytherapy comparison, with M. Mitch as the compiler and reporter of the results. Mexico and Argentina expressed interest in participation.

C. Soares will write a protocol for a comparison of beta particle dosimetry and will circulate a chamber and electrometer for this comparison. Jose Alvarez will be the participant from Mexico. Canada will also participate.

C. Soares proposed a comparison for planar eye-applicator, beta particle therapy. Jose Alvarez of Mexico will participate, and Germany (PTB) and the Netherlands (NMi) are likely to participate, also. Brazil may take part even though they do not have a CMC in this specialty.

C. Soares reported that EUROMET will be leading a comparison with a planar ruthenium applicator with PTB and NMi participating. NIST will take part and invite Mexico to do so, as well.

C. Soares reported an on-going comparison with NMi for a beta line source; PTB will not participate in this one, and it will not impact SIM.

L. Karam pointed out that there is guidance on the BIPM web sit for setting up protocols (http://www.bipm.org/utils/en/pdf/guidelines.pdf).

Dosimetry – High range

NIST does an annual comparison with the UK (NPL) of dosimetry for polymer cross-linking and medical device sterilization. The most recent has been written up and submitted to the BIPM, but it has not yet been published. L. Karam said that it may be published electronically.

Argentina (CNEA) uses chromates for ^{60}Co radiation and would be interested in a comparison. Mexico and Brazil expressed interest in the comparison. Brazil has been using Fricke dosimeters for food irradiation dosimetry in cooperation with the IAEA, but the IAEA is dropping this activity. Private companies in Brazil may want to make a direct comparison with NIST.

Radioactivity

The recent CCRI – Group II meeting accepted a NIST-piloted comparison of radioactivity in seaweed and shellfish to support CMCs of specific reference materials. Awaiting changes to draft B to prepare draft A for seaweed.

M. Unterweger will write a protocol for a key comparison of measurements of tritium in water. Brazil and Argentina will participate.

Another comparison under CCRI – II will involve ^{35}S and ^{55}Fe. CNEA would like to take part.

A comparison of ^{99m}Tc will require circulating an instrument instead of a source, because of the short half-life.

L. Karam will keep SIM informed of CCRI comparisons.

Brian Zimmerman will be returning to NIST in April and will complete the report of a ^{131}I radioactivity comparison.

Neutrons

M. S. Dewey proposed a comparison of neutron survey meters at NIST in AmBe, ^{252}Cf, and moderated ^{252}Cf neutron fields. Participants would bring or send their instruments to NIST for the comparison in NIST fields. Canada, Brazil, and Mexico indicated interest in participating.

Evaldo Simões da Fonseca will write a protocol for a comparison of personal dosimeters in cooperation with Oak Ridge National Laboratory. Mexico will participate.

8. Discussion on Chairmanship for Group
Lisa Karam was selected as the Chair of MWG 6 by unanimous vote.

9. Update on laboratory activities in ionizing radiation
C. Ross of the NRC (Canada) reported that he was writing up the results of a completed SIM comparison of ^{60}Co air kerma measurements, SIM.R1(1)K1. Ken Shortt led this effort for the NRC, which acted as the pilot laboratory. Argentina, Mexico, Brazil, Venezuela, the USA, Canada, and the IAEA participated. The uncertainty analysis by Venezuela is not yet complete. Ross also reported that a comparison of absorbed dose, SIM.R1(1)K4 was in a similar state of completion.

Marc Desrosiers gave a presentation of highlights of the NIST Quality System.

V. Tovar reported that Mexico's SSDL had ongoing metrology activities involving neutrons; x-rays at levels for medical imaging, mammography, and therapy; radioactivity; and personnel dosimetry, including a beta extrapolation chamber and air kerma measurements for ^{60}Co radiation.

C. da Silva described the LNMRI laboratories that belong to Radiation Protection Dosimetry Institute with a staff of 31 people that work in radionuclide standardization, low-level radioactivity measurement, dosimetry, and neutrons. In 2004, IRD/LNMRI submitted their quality system to Peer Review; the QS was evaluated by Portugal (IPQ), with the technical part evaluated by France (LNHB). The IRD/LNMRI quality system was approved in 2004 in the SIM meeting at Venezuela.

M. Saravi reported that the CNEA Quality System was audited in 2003, accredited by SIM in 2004, and audited again in 2005. CNEA has capabilities for ^{60}Co air kerma and absorbed dose, and x-ray measurements at the dose levels appropriate for radiation protection and therapy. Amanda Iglicki reported that the LMR radioactivity capabilities were accredited by Spain.

Many more details of these presentations are contained in the working documents of the meeting.

10. Date and place of next meeting – in 2007 or 2009
The next meeting of MWG 6 was tentatively agreed to be at NIST in October 2007 following the CIRMS meeting. The decision will be revisited in 2006.

Respectfully submitted,

David M. Gilliam
14 November 2005

Modifications and editing
Lisa Karam
29 November 2005