Report of SIM Laboratories to the CCRI (Section III, neutron measurements)
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Neutron Measurements (Section III):

Comparisons Section III (neutron measurements) of the CCRI conducted a comparison of primary measurements of the neutron emission rate of an ^{241}Am-Be(alpha,n) radionuclide source ["International Comparison of Measurements of Neutron Source Emission Rate (1999-2005) - CCRI(III)-K.9" (NPL -- Neil Robert)] in which a single ^{241}Am-Be(alpha,n) source was circulated to all participants between 1999 and 2005. Eight laboratories (two from SIM) participated - CIAE (China), CMI (Czech Republic), KRISS (Republic of Korea), **LMRI (Brazil)**, LNE-LNHB (France), **NIST (USA)**, NPL (UK), and VNIIM (Russia) - with NPL making their measurements at the start and repeating them near the end of the exercise to verify the stability of the source. Each laboratory reported the emission rate into 4-pi sr, together with a detailed uncertainty budget, using the manganese bath technique (VNIIM also made measurements using an associated particle technique). CMI, KRISS and VNIIM also measured the anisotropy of the source, although this did not formally form part of the comparison. CCRI(III)- K9.AmBe (1999 – 2005) is currently in Draft A, which has been reviewed by LNMRI and NIST.

Discussed proposals for future comparisons At the SIM MWG-6 Meeting in 2005 (minutes accompany this report), NIST had 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. Not much has yet happened on this due to time constraints but the current schedule at NIST is such that work can begin on organizing the comparison. In addition, LNMRI/IRD has expressed an interest in participating in bilateral comparisons with NIST (USA) for three possible comparisons [neutron source measurement in bath system, irradiation/ calibration of personal monitors (a proposed approach appears at the end of this report), and for calibration of survey area monitors]. Further discussions are expected later in 2007 (including possible participation of other laboratories).

Status of CMCs No updates are anticipated to the CMCs currently posted for neutrons, although LNMRI/IRD has begun studies to update their bath system.

Quality Systems The NIST (USA) QS had been internally reassessed (September 2005) and self-declared in conformance with ISO/IEC 17025:1999, ISO Guide 34 and the NIST QS for high dose dosimetry, neutron dosimetry, natural matrix radioactive SRMs, and radioactive SRMs (accepted by the SIM-QSTF in March 2006). A second internal reassessment (September 2006) was also done.

Since 2005, LNMRI (Brazil) has had two internal audits according to the requirements of their QS (based on ISO/IEC 17025). The next internal audit is expected in August 2007; two new software programs for the quality control system are being implemented.

"SIM Comparison of Personal Neutron Dosimeters"
As proposed and written by LNMRI/IRD

In the last SIM MWG 6 – Ionizing Radiation meeting (October 2005), LNMRI/IRD (Brazil) was tasked with proposing a protocol for a comparison of personal neutron dosimeters similar to that which was promoted by ORNL 10 years ago.

The main idea of this comparison is to offer participants the opportunity to test their personnel neutron dosimeters in a variety of radiation fields (with reference values provided by NIST), and to compare their results with those of others making measurements under identical conditions. It is possible to include in this comparison the photon personnel dosimeters, but probably the number of personnel dosimeters to be irradiated would be higher. The neutron dosimeters irradiations would be performed using: ^{252}Cf bare, ^{252}Cf with moderation, and ^{137}Cs. Other radiation fields available at NIST will be available (reactor neutron beam). Personal neutron dosimeters are to be mounted on the front faces of 30x30x15 cm^3 PMMA slab phantoms and irradiated to a range of dose equivalents which may be encountered during routine personnel monitoring.

Participants should mail all their personal neutron dosimeters to NIST where the staff would coordinate irradiations. Personal neutron dosimeters will be returned to participants by mail as soon as possible after exposure. Participants agree to furnish their final dose equivalent estimates and a completed questionnaire concerning type and description of dosimeters used in the study. The NIST staff will publish results of this comparison as a report and distribute it to the participants.

There is no fee to participate in the comparison. Non-US participants are cautioned not to send their dosimeters through customs since it could result in a significant delay and may be expensive. The NIST will not pay to get dosimeters through customs. Past experience has shown that a label "Scientific Equipment of no Commercial Value" will help, but not be sufficient now because the security procedures. Participants may choose to participate in any or all exposure categories.

The NIST staff will mount a **maximum of three** dosimeters per participant per irradiation. In addition, participants may send a maximum of three control (i.e. background) dosimeters. Dosimeters should be labeled as follows:

Participant-identifying acronym -----→ "XYZ"
Exposure number -------→ "x"
Dosimeter number for that exposure (1 through 3) --------→ "y"
Background dosimeters should be labeled B1, B2 and B3.

Proposed exposure conditions:

Exposure number	Source description	Distance (meters)
1	15 cm D_2O moderated ^{252}Cf	0.5
2	15 cm D_2O moderated ^{252}Cf	0.75
3	^{252}Cf (bare)	0.75
4	15 cm D_2O moderated ^{252}Cf, 60 degree about horizontal centerline, top towards phantom	0.5
5	^{137}Cs	2