SSDL Newsletter

No. 53 January 2007

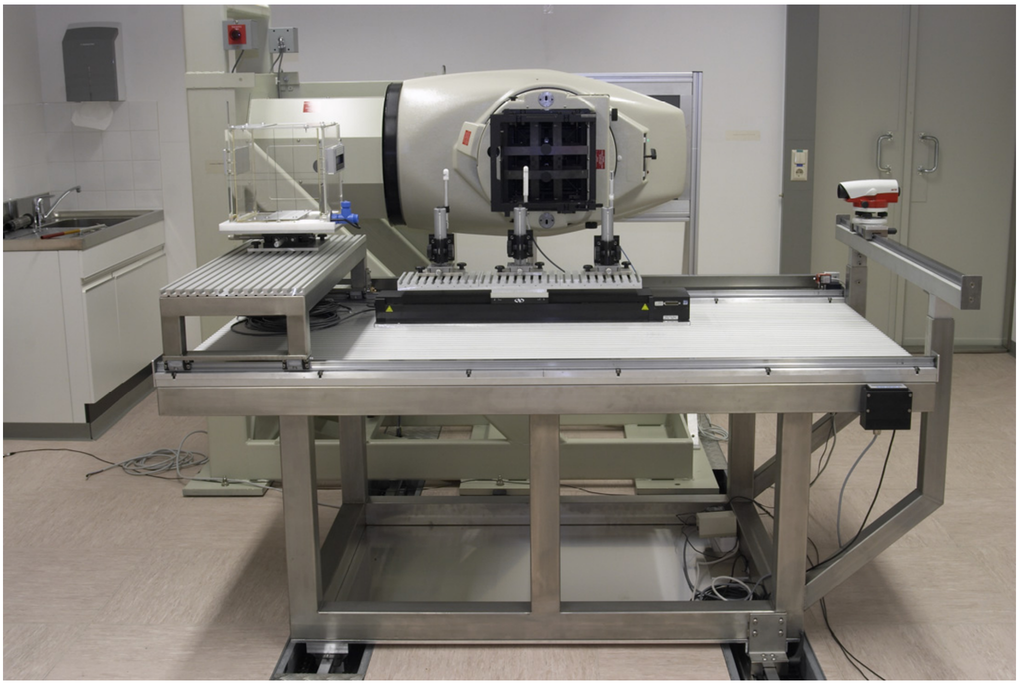
Prepared by the Joint IAEA/WHO Secretariat of the SSDL Network
http://www-naweb.iaea.org/nahu/external/e3/ssdl.asp ISSN 1011-2669

IAEA

IAEA/WHO Network of Secondary Standards Dosimetry Laboratories

Contents

IAEA
International Atomic Energy Agency



Newly constructed ^{60}Co calibration room at the IAEA calibration laboratory (Credit: E. Izewski/IAEA)

From the editor

This issue of the SSDL Newsletter contains three contributions. The first contribution is a presentation of the SSDL of South Africa (a member of the IAEA/WHO Network since 2001), which has also been nominated as a Regionally Designated Centre for calibration activities in Africa. The second contribution is a brief note on a recently published IAEA guidance document, Technical Reports Series No. 454, on "Quality Assurance for Radioactivity Measurement in Nuclear Medicine". The document is currently available on-line at the IAEA's Publications website and in hardcopy. The third contribution is a brief note on the IAEA Calibration and Measurement Capabilities (CMCs) and related Quality Management System (QMS). The IAEA CMCs were published in Appendix C of the BIPM Key Comparison Database in June 2002. The IAEA QMS, which is based on ISO/IEC 17025, was peer-reviewed by a panel of four (independent experts in 2004. At the invitation of the International Committee of Weights and Measures (CIPM), the IAEA QMS was presented for review by a panel of experts identified by the Regional Metrology Orgnaizations (RMOs). The Joint Committee of the Regional Metrology Orgnaizations and the BIPM JCRB) approved the IAEA QMS on 6 October 2006. The IAEA QMS is reviewed every four years by a panel of independent experts, and every two years by selected external members of the IAEA/WHO Standing Advisory Committee. The IAEA will, whenever possible and if resources permit, support SSDL members in the establishment of a QMS based on ISO/IEC 17025.

STAFF OF THE DOSIMETRY AND MEDICAL RADIATION PHYSICS (DMRP) SECTION

International Atomic Energy Agency, Wagramer Strasse 5, P.O. Box 100, A-1400 Vienna, Austria
Telephone: (+43-1) 2600+extension; Fax: (+43-1) 26007, e-mail:Official.Mail@iaea.org

Name	*Position/tasks*	*E-mail address*	*Extension*
Shortt, Ken	Section Head	k.shortt@iaea.org	21662
Bera, Pranabes	Senior Laboratory Technician, TLD	p.bera@iaea.org	28330
Czap, Ladislav	Senior Laboratory Technician Ionization chamber calibration	l.czap@iaea.org	28332
Girzikowsky, Reinhard	Senior Laboratory Technician High dose and mammography	r.girzikowsky@iaea.org	28328
Izewska, Joanna	TLD Officer, Head, Dosimetry Laboratory Unit	j.izewska@iaea.org	21661
Meghzifene, Ahmed	SSDL Officer Editor, SSDL Newsletter	a.meghzifene@iaea.org	21653
McLean, Ian Donald	Medical Radiation Physicist Diagnostic Radiology	i.mclean@iaea.org	21663
Vatnitsky, Stanislav	Medical Radiation Physicist Treatment planning systems	s.vatnitsky@iaea.org	21660
Flory, Rosemary	Secretary	r.flory@iaea.org	21662
Danker, Sabine	Secretary	s.danker@iaea.org	21665
Barrios, Lucille	Secretary	l.barrios@iaea.org	21634
DMRP Section		dosimetry@iaea.org[a]	21662

[a] This is the general e-mail address of the DMRP Section where all correspondence not related to specific tasks of the staff above should be addressed. Please note also that there is regular rotation of the staff of the IAEA, so that messages addressed to someone who has left might be lost. Each incoming message to the general dosimetry mailbox will be re-distributed to the staff member concerned, as appropriate.

SERVICES PROVIDED BY THE IAEA IN DOSIMETRY AND MEDICAL RADIATION PHYSICS

The IAEA's Dosimetry and Medical Radiation Physics programme is focused on services provided to Member States through the IAEA/WHO SSDL Network and on a system of dose quality audits. The measurement standards of Member States are calibrated, free of charge, at the IAEA's dosimetry laboratory. The audits are performed through the IAEA/WHO TLD postal dose assurance service for SSDLs and radiotherapy centres.

The IAEA Calibration and Measurement Capabilities (CMCs) have been reviewed and published in the CIPM's (Comité International des Poids et Mesures) Appendix C. Additional information can be found at the web site:

http://kcdb.bipm.org/AppendixC/search.asp?met=RI

The range of services is listed below.

Services	*Radiation quality*
Calibration of ionization chambers (radiotherapy, diagnostic radiology including mammography and radiation protection, including environmental dose level)	X rays (10–300kV) and gamma rays from ^{137}Cs and ^{60}Co
Calibration of well type ionization chambers for low dose rate (LDR) brachytherapy	γ rays from ^{137}Cs
Comparison of therapy level ionization chamber calibrations (for SSDLs)	γ rays from ^{60}Co
TLD dose quality audits for external radiotherapy beams for SSDLs and hospitals	γ rays from ^{60}Co and high energy X ray beams
TLD dose quality audits for radiation protection for SSDLs	γ rays from ^{137}Cs
Reference irradiations to dosimeters for radiation protection	X rays (40–300 kV) and γ rays from ^{137}Cs and ^{60}Co beams

Member States who are interested in these services should contact the IAEA/WHO SSDL Network Secretariat for further details, at the address provided below. Additional information is also available through the Internet at the web site: http://www-naweb.iaea.org/nahu/dmrp/ssdl.asp.

IAEA/WHO SSDL Network Secretariat
Dosimetry and Medical Radiation Physics Section
Division of Human Health
International Atomic Energy Agency
P.O. Box 100
A-1400 Vienna
Austria
Telephone: +43 1 2600 21662
Fax: +43 1 26007 21662
E-mail: dosimetry@iaea.org

The IAEA Calibration and Measurement Capabilities

A. Meghzifene, K. Shortt
Dosimetry and Medical Radiation Physics Section
IAEA

1. Introduction

One of the mandates of the IAEA is to provide assistance to Member States to enable them to use nuclear technologies safely and effectively. In support of this mandate, the IAEA provides traceable (dosimetry) standards, calibrations and audit services for medical applications of ionizing radiation and for radiation protection.

The IAEA's Dosimetry Laboratory is the central laboratory of the IAEA/WHO Network of Secondary Standards Dosimetry Laboratories (SSDLs). To fulfill its function as the central laboratory, the IAEA has to acquire and properly maintain dosimetry standards traceable to the international system of measurements (Système International, SI). These dosimetry standards are disseminated to the SSDLs in the Member States by calibrating their reference standards through comparison with IAEA transfer standards. In this way, the members of the SSDL Network can be assured that each of their dosimetry standards has a calibration that is traceable to the SI. Follow-up programmes and dose quality audits are implemented to enable SSDLs to demonstrate their calibration and measurement capabilities [1].

2. IAEA calibration and measurement capabilities (CMCs)

The main activities of the IAEA Dosimetry Laboratory are to maintain the reference standards for dosimetry in radiotherapy, diagnostic radiology (mammography) and radiation protection. These standards are used to undertake calibrations for SSDLs, and participate in international comparisons organized by the Regional Metrology Organizations (RMOs).

Following its signing of the MRA in October 1999, the IAEA has prepared its Calibration and Measurement Capabilities (CMCs). These CMCs have undergone a review process under the auspices of the CCRI(I), prior to the interregional review by the RMOs, and were subsequently entered into Appendix C of the BIPM database [2].

The IAEA CMCs include 13 calibration services:

1. IAEA-RAD-1001: absorbed dose to water, ^{60}Co (external therapy)
2. IAEA-RAD-1002: air kerma, ^{60}Co (external therapy)
3. IAEA-RAD-1003: air kerma, CCRI(1) X ray beams, 100 kV to 250 kV (external therapy)
4. IAEA-RAD-1004: air kerma, CCRI(1) X ray beams, 10 kV to 50 kV (external therapy)
5. IAEA-RAD-1005: air kerma, Reference air kerma rate, ^{137}Cs (LDR brachtherapy)
6. IAEA-RAD-1006: air kerma, 23 kV to 35 kV, Mo beams (mammography)
7. IAEA-RAD-1007:, air kerma, 25 kV to 40 kV, Rh beams (mammography)
8. IAEA-RAD-1008:, air kerma, 40 kV to 300 kV, ISO-4037 narrow spectra series (radiation protection)
9. IAEA-RAD-1009: air kerma, ^{137}Cs, (radiation protection)
10. IAEA-RAD-1010: air kerma, ^{60}Co, (radiation protection)
11. IAEA-RAD-1011: ambient dose equivalent, 40 kV to 300 kV, ISO-4037 narrow spectra series (radiation protection)
12. IAEA-RAD-1012: ambient dose equivalent, ^{137}Cs (radiation protection), and
13. IAEA-RAD-1013: ambient dose equivalent, ^{60}Co (radiation protection).

For diagnostic radiology, calibration services in mammography beams are available (IAEA-RAD-1006 and 1007 for Mo and Rh beams, respectively). Calibrations in X ray diagnostic radiology beams, as specified in IEC standard [3] are not yet established. X ray diagnostic radiology calibrations will be conducted in the newly constructed bunker. The measuring cart and the X ray equipment will be installed during the 2nd quarter of 2007.

IAEA policy for instrument calibration

The IAEA calibrates reference standards for SSDLs. As a general rule, the IAEA does not calibrate field class instruments for end users. Exceptionally, the IAEA has calibrated reference instruments from radiotherapy hospitals in countries where there are no SSDLs. Whenever possible, calibrations for end users from such countries are referred to other SSDL members in the region who have demonstrated their calibration capabilities through regional or international comparisons. SSDLs that are interested in IAEA calibrations should send a request to the IAEA by filling in the form (see Appendix 1, downloadable from: http://www-naweb.iaea.org/nahu/dmrp/Calibrationform.doc) and sending it to the SSDL Officer. The IAEA will schedule the calibration (typically within 3–5 months, depending on the workload) and communicate the dates to the SSDL. It is important to note that for countries where there is more than one SSDL, the IAEA will calibrate only one reference standard for a given physical quantity. For SSDLs that have a reference and a working standard, both instruments may be calibrated at the IAEA. Following each calibration, a certificate is issued. A document describing the IAEA calibration procedure is attached to each calibration certificate. The attachments can also be downloaded from: http://www-naweb.iaea.org/nahu/dmrp/ssdl.asp. It is a policy of the IAEA to report the uncertainty associated with its calibrations with a coverage coefficient of k=2, which, for a normal distribution, corresponds to a level of confidence of about 95%.

Many SSDLs have inquired about the recommended frequency of recalibration of their standards. The IAEA/WHO SSDL Network Charter [4] gives a maximum five year time frame. In practice, most SSDLs recalibrate their standards every three to four years. If something happens to the reference instrument or if an unusual result is detected during quality control measurements, the reference standards should be checked and sent for recalibration without delay. It is important that a periodic quality control programme is implemented to ensure the stability of the reference standards (such as check source measurements, output rate measurements and cross-calibrations). In case of doubt, the reference standard should be checked and sent for recalibration as soon as possible.

IAEA quality system for instrument calibration

The Dosimetry Laboratory is operated under an established Quality Management System (QMS) according to the requirements of ISO/IEC standard 17025 [5]. One of the key elements of the QMS is the documentation describing the policy, responsibilities and procedures for the operation of the laboratory. The documentation consists of a quality manual and a set of Dosimetry Operating Laboratory Procedures (DOLPs), including detailed instructions and forms. The quality manual describes the policy regarding all the activities in the Dosimetry Laboratory. It specifies various responsibilities for administration of the Quality Assurance Programme and for the operation of the Dosimetry Laboratory, and also provides details of all the activities in practice at the laboratory. The first six DOLPs describe the types of dosimetry systems that are maintained in the Dosimetry Laboratory as secondary/reference standards. Each DOLP describes the necessary equipment, the procedure for maintaining and using them at the specified level of quality, documentation to be maintained, the uncertainty associated with the measurements using the dosimetry system, etc. The next nine DOLPs describe the services that are offered to the Member States. Each DOLP delineates the technical as well as the administrative aspects of this service. The last DOLP describes the operation and safety aspects of the various irradiation units and sealed sources that are being used for calibration of dosimeters. The documents issued by DOL are reviewed every two years and, where necessary, they are revised to ensure their continuous suitability and compliance with the relevant requirements.

At the invitation of the International Committee of Weights and Measures (CIPM), the IAEA QMS was presented for review by a panel of experts identified by the RMOs. The Joint Committee of the Regional Metrology Organizations and the BIPM (JCRB) approved the IAEA QMS on 6 October 2006.

It is intended that the documentation for the IAEA's QMS on calibration of instruments be distributed to SSDLs upon request.

To assess the level of satisfaction of SSDL members with the IAEA calibration services, a satisfaction survey (see Appendix 2) was distributed to SSDL members in early 2007. SSDL members that have not yet provided their feedback are encouraged to fill in the form given in Appendix 2 and send it to the IAEA Dosimetry and Medical Radiation Physics Section. The feedback will be summarized and communicated to all SSDL members.

References

[1] MEGHZIFENE, A., CZAP, L., SHORTT, K.R., ANDREO. P., "Comparison of calibration coefficients in the IAEA/WHO network of SSDLs", (Proc. International Symposium on Standards and Codes of Practice in Medical Radiation Dosimetry, Vienna, Austria 25-28 Nov 2002), IAEA-CN-96/38P, IAEA, Vienna (2002).

[2] BUREAU INTERNATIONAL DES POIDS ET MESURES, Appendix C of the Mutual Recognition Arrangement, BIPM Key Comparison Database, Available from the BIPM website: http://kcdb.bipm.org/appendixC/default.asp

[3] INTERNATIONAL ELECTRO-TECHNICAL COMMISSION, Medical Diagnostic X ray Equipment - Radiation Conditions for Use in the Determination of Characteristics, ISO/IEC 61267, ISO Geneva (2005).

[4] INTERNATIONAL ATOMIC ENERGY AGENCY, The SSDL Network Charter, IAEA, Vienna (1999).

[5] INTERNATIONAL ORGANIZATION OF STANDARDIZATION/INTERNATIONAL ELECTROTECHNICAL COMMISSION, General Requirements for the Competence and Testing Calibration Laboratories, ISO/IEC 17025, ISO, Geneva (2000).

Appendix 1.

Department of Nuclear Sciences and Applications
Division of Human Health
Dosimetry and Medical Radiation Physics Section
Wagramer Strasse 5, P.O. Box 100
A-1400 Vienna, Austria

REQUEST FOR CALIBRATION OF INSTRUMENTS

A. General information

Name and address of SSDL or hospital	SSDL/Hospital: ____________________ ____________________
Name, telephone, fax and e-mail of contact person	Name: ____________________ Tel: ____________ Fax: ____________ E-mail: ____________________

B. Description of instruments[1] requiring calibration

Manufacturer	Model/Type	Serial number[2]	Radia-tion quality[3]	Polarizing voltage[4] and sign (+ or –)

C. FOR IAEA USE ONLY

Received:
……………………………

Functional Status:
……………………………
……………………………
……………………

Calibration:
……………………………

Dispatched:
……………………………

Certificate:
……………………………
……………………………

[1] For low dose rate brachytherapy, a source holder should be sent together with the ion chamber and electrometer.

[2] If more than two (2) electrometers and ion chambers are sent, please specify the serial number of each electrometer and ion chamber that should be calibrated together

[3] Indicate the beam quality code (see: http://www-naweb.iaea.org/nahu/dmrp/xrayradiationqualities. asp#theraphy). Absorbed dose to water calibration is only available for ^{60}Co. Whenever possible, the chamber waterproof sleeve should be sent together with the chamber. For hospitals, please indicate if IAEA TRS-398, or another dosimetry protocol based on absorbed dose to water standards, is used.

[4] See Technical Note in Newsletter No. 52 (see http://www-pub.iaea.org/MTCD/publications/PDF/Newsletters/SSDL-NL-52.pdf).

D. Transport of the instruments to the IAEA

- The instruments will be sent to the IAEA by international carrier: ______________________________
- The instruments will be handcarried to the IAEA by: ____

E. Customs formalities handled by

- United Nations Development Programme (UNDP) office in your country: ______________________
- ATA Carnet: ____
- Other (temporary import, etc.): ____

F. Official authorization

Name (in capital letters): ____

Signature: _______________________________________ Date: ____________________________________

PLEASE FILL OUT PARTS A, B (including footnotes 2 and 3), D, E AND F OF THIS FORM AND FAX IT TO: + 43 1 26007 21662, or send the signed PDF file to: dosimetry@iaea.org.

Appendix 2.

INTERNATIONAL ATOMIC ENERGY AGENCY

Dosimetry and Medical Radiation Physics Section
Division of Human Health

THE IAEA/WHO NETWORK OF SSDLs

CUSTOMER SATISFACTION SURVEY FORM

Please help us in our continuous improvement process by completing this form and returning it to us* as soon as possible.

How do you rate the following:	**Excellent**	**Very Good**	**Good**	**Average**	**Poor**	**N/A**
The quality of our calibration services?	☐	☐	☐	☐	☐	☐
The appropriateness to your questions and concerns?	☐	☐	☐	☐	☐	☐
The timeliness of IAEA response?	☐	☐	☐	☐	☐	☐
The communication with IAEA staff in charge of calibration services?	☐	☐	☐	☐	☐	☐
Your overall level of satisfaction with our services?	☐	☐	☐	☐	☐	☐
Additional comments:						

To ensure anonymity of response, please do not provide any details on the respondent. If you would like us to follow up with you on a pending matter, please send us a separate e-mail to dosimetry@iaea.org.

**Please send the form (by e-mail, fax or post) to:*

Dosimetry and Medical Radiation Physics Section
Division of Human Health
International Atomic Energy Agency
Wagramer Strasse 5
P.O. Box 100
A-1400 Vienna
Austria

Tel: +43 1 2600 21653
Fax: +43 1 26007 21662
E mail: dosimetry@iaea.org

Code of Practice for Radioactivity Measurement in Nuclear Medicine

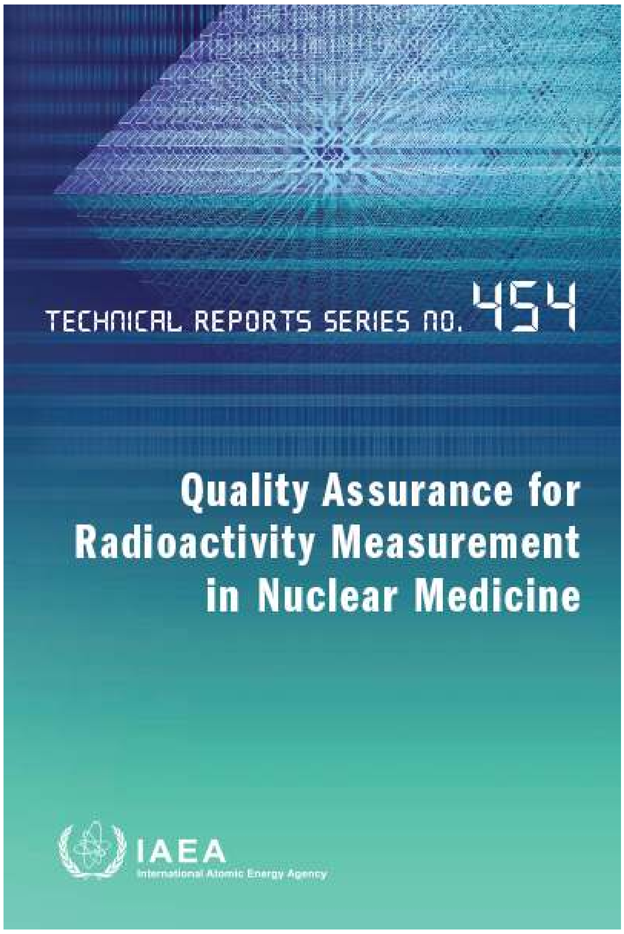
B.E. Zimmerman[1]
Radioactivity Group, Physics Laboratory
National Institute of Standards and Technology, Gaithersburg, MD, USA

The use of radionuclides for diagnosing and treating diseases continues to be a growing area of radiation medicine. Because the dose delivered to the patient is dependent on the amount of radioactivity contained in a radiopharmaceutical, the measurement of radioactivity at all levels of nuclear medicine practice (radionuclide producer, radiopharmaceutical manufacturer, radiopharmacy, etc.) plays an important role in determining the safety and efficacy of nuclear medicine procedures that employ unsealed sources of radioactivity. The implementation of a quality assurance (QA) programme for radioactivity measurements in nuclear medicine is important for ensuring the accuracy and consistency of those measurements.

The implementation of such programmes has been slow to develop and keep pace with the rising number and complexity of the nuclear medicine procedures. This is probably due to the fact that, until recently, there has been no uniform, international guidance that was available to assist institutions in developing and implementing such programmes in their countries, particularly in the developing world. The International Atomic Energy Agency (IAEA), in consultation with a group of experts in the representative fields of radioactivity measurement in nuclear medicine, has recently published such a guidance document, IAEA Technical Reports Series No. 454: Quality Assurance for Radioactivity Measurement in Nuclear Medicine that addresses this need. The format of the document is based on the principles and structure of the ISO 17025 standard and covers all the components necessary for the successful implementation of a QA programme for radioactivity measurement within the narrow scope of measurements and calibrations in nuclear medicine.

In addition to applying the managerial, technical, and safety components of ISO 17025 specifically to nuclear medicine, the document goes a step further to give specific instructions on how to properly make the most common radioactivity measurements in nuclear medicine, including radionuclide and radiochemical purity and radioactivity content using radionuclide activity calibrators ("dose calibrators"). To assist those who might participate in an audit of a radioactivity measurement laboratory sample audit forms are included, as well as forms necessary to properly document training and qualifications of personnel.

Finally, the new guidance document stresses the need for traceability in radioactivity measurement, even at the clinical level, and demonstrates how this can be achieved through a number of examples.



The document is currently available in hardcopy and on-line at the Agency's Publications website:

http://www-pub.iaea.org/MTCD/publications/PDF/TRS454_web.pdf

[1] B.E. Zimmerman is a former IAEA staff member.

Activities at the CSIR-NML SSDL

Z.L.M. Msimang, J. Mostert, B. Simpson
CSIR-NML SSDL, Pretoria, South Africa

The Council for Scientific and Industrial Research National Metrology Laboratory (NML) maintains primary scientific standards of physical quantities for South Africa and compares those standards with other national standards to ensure measurement equivalence with the global community.

The NML supports South Africa's global competitiveness through the provision of internationally acceptable measurement standards and measurements. It performs this duty by representing South Africa at the Metre Convention, actively advancing metrology in the region and Africa, keeping and maintaining physical and chemical measurement standards and ensuring the basic competence to prove measurement equivalence in three metrology competence areas mechanical, chemical and electromagnetic.

Mechanical metrology: Realizes, maintains and disseminates the national measurement standards for acoustics, ultrasound and vibration, dimensional, force, torque and hardness, pressure, flow, mass and volume. Provides measurements not yet commercially available locally to the automotive sector and creates awareness of metrology in the automotive manufacturing sector.

Metrology in chemistry: Prepares and certifies organic and inorganic reference materials and standards through a comprehensive suite of techniques or by primary method, prepares and certifies primary gas mixtures, calibrates gas and breath alcohol analysers, provides sophisticated surface and micro analysis and traceability for nano-technology related measurements, provides proficiency testing and performs value assignment of materials.

Electromagnetic metrology: Realizes, maintains and disseminates the national measurement standards for DC low frequency, time and frequency, radio frequency, fibre optics, photometry and radiometry, temperature and humidity, ionizing radiation and radioactivity standards.

The focus of the article will be in the areas of ionizing radiation and radioactivity. Both laboratories have submitted calibration and measurement capabilities (CMCs) to the BIPM database.

Ionising Radiation Laboratory

The Ionising Radiation Laboratory of the CSIR-NML currently provides traceability in the area of radiation therapy and protection to hospitals, mines, national regulators, research institutes and other commercial institutions in the country and also the Southern African Development Community (SADC) region. The standards maintained by the laboratory are all secondary standards and as such have demonstrable international traceability. The laboratory is ISO/IEC17025 accredited through the South African National Accreditation System (SANAS) for most of its services.

In the gamma radiation dosimetry area, the laboratory maintains the National Measuring Standard for absorbed dose to water and the National Measuring Standard for air kerma. These standards provide traceability for therapy level measurements in terms of absorbed dose to water in ^{60}Co gamma radiation and in terms of air kerma in ^{60}Co gamma radiation and X ray energies ranging from 50 to 250 kV. These standards are mainly used to provide calibration services for radiotherapy centres. Fig. 1 shows a set-up for the absorbed dose-to-water measurements in ^{60}Co.

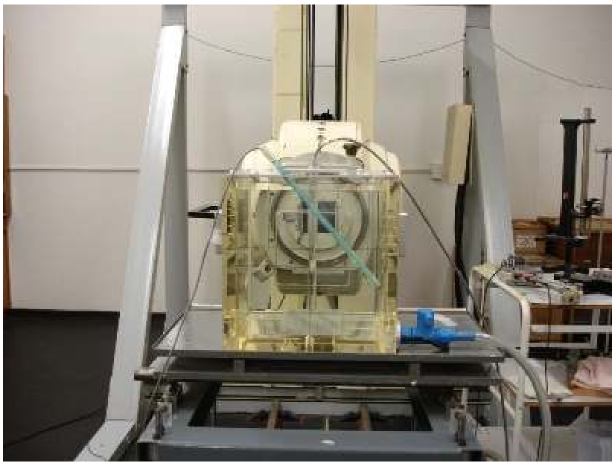


FIG. 1. Set-up for absorbed dose to water in ^{60}Co.

The laboratory also maintains protection level gamma radiation standards for ^{60}Co, ^{137}Cs and ^{241}Am, which are traceable to the National Measurement Standard for air kerma. These standards are used to provide calibration services to radiation protection practitioners in the mining industry, health sector, industrial radiography and regulatory institutions.

The National Measurement Standard for absorbed dose to tissue in beta radiation consists of two small planar beta radiation sources. One of the sources is ^{90}Sr/^{90}Y and the other is ^{85}Kr. This standard is used mainly to perform irradiations of thermoluminescent dosimeters (TLDs) for the Radiation Protection Services of the South African Bureau of Standards. In addition to the National Measurement Standard for absorbed dose to tissue in beta radiation, a standard ophthalmic applicator is maintained. The CSIR-NML and the National Department of Health have agreed to compare all ophthalmic applicators in clinical use to this standard applicator on a regular basis in order to monitor the output of the clinically used applicators.

In addition to gamma dosimetry standards, the laboratory also maintains neutron and some radioactivity standards. In the neutron field, the laboratory maintains a set of Am-Be neutron sources that are used to calibrate neutron monitors and to irradiate TLDs in terms of ambient dose equivalent. These sources are calibrated periodically at a primary standards facility. In the radioactivity field, standards for particle emission rate as well as radon are maintained. The national measuring standard for particle emission rate consists of a set of four large area sources (^{241}Am, ^{36}Cl, ^{90}Sr/^{90}Y and ^{14}C). These are used to provide traceability in terms of surface emission rate for other large area sources used in the laboratory as well as in other calibration laboratories. Large area sources are used to calibrate contamination monitors in terms of surface activity response and 2π efficiency. Contamination monitors are used extensively in the mining industry to detect radioactive contamination, see Figs 2 and 3.

FIG. 2. Calibration set-up for a linearity check of a contamination monitor in front of a multiple source head.

The laboratory's radon facility is used to provide a well defined radon atmosphere in which radon gas and progeny monitoring devices can be exposed.

New developments include the setting up of calibration facilities for diagnostic radiology in cooperation with the International Atomic Energy Agency (IAEA), as well as decommissioning of the ^{60}Co unit, used for calibration in therapy level and installing one previously used by a local hospital. This is done to minimize the costs for source replacement.

FIG. 3. Calibration set-up of a contamination monitor for 2π efficiency and surface activity response.

Currently the medical physics community in South Africa is in the process of changing from using an air kerma based protocol to one based on absorbed dose to water. The air kerma based protocol that was followed was the AAPM TG21, "A protocol for the determination of absorbed dose from high-energy photon and electron beams." The primary reason for this change is to be in line with the international trend towards the use of absorbed dose to water protocols. The protocol of choice that was adopted for South Africa is IAEA Technical Reports Series (TRS) No. 398, Absorbed Dose Determination in External Beam Radiotherapy: An International Code of Practice for Dosimetry based on Standards of Absorbed Dose to Water.

A voluntary audit exercise was started recently in order to determine the capability of hospitals to measure absorbed dose to water using the IAEA Technical Reports Series No. 398 protocol. The audit is being performed by the CSIR-NML under the auspices of the South African Medical Physics Society (SAMPS). The instruments used were supplied by the IAEA, in the framework of a technical cooperation project, to SAMPS and are being maintained by the CSIR-NML on request from SAMPS.

The kit consists of a PTW Unidos electrometer, a 0.6 cc TW30012 ionization chamber, a mercury in glass thermometer and a barometer. Fig. 4 shows the results so far.

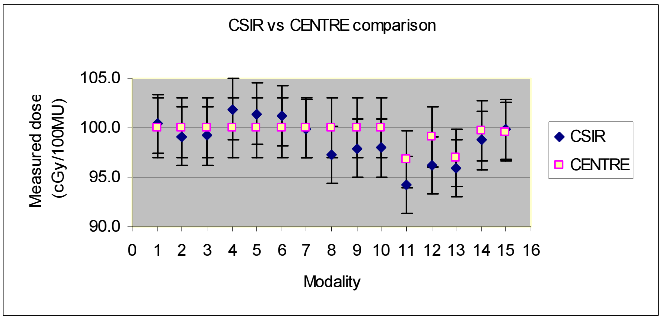


FIG. 4. Results of a voluntary audit exercise to determine the capability of hospitals to measure absorbed dose to water using the IAEA TRS-398 protocol.

Radioactivity Standards Laboratory

The Radioactivity Standards laboratory maintains South Africa's national radioactivity measurement standard. The laboratory has primary and secondary standards. An important role of this laboratory is to undertake activity measurements for customers and supply radioactivity standards for the calibration of nuclear instrumentation such as ionization chambers and HPGe gamma ray detectors. These measurements and standards provide the customer with a traceability link to the highly accurate national standards (see Fig. 5).

FIG. 5. Liquid scintillation counting system that houses three phototubes and a NaI(Tl) detector. The apparatus forms the basis of a number of absolute counting techniques.

The user community is comprised of radionuclide production facilities, nuclear medicine departments, environmental radioactivity laboratories, etc. The laboratory is ISO/IEC17025 accredited through the South African National Accreditation System (SANAS) for most of its services.

The laboratory has the capability to measure the activity of radioactive solutions by absolute methods. These methods are independent of calibrated equipment or the use of reference standards. To check measurement uniformity and demonstrate equivalence to other national laboratories worldwide, the CSIR-NML regularly participates in international and regional key comparisons. Those completed during the past few years include ^{192}Ir, ^{54}Mn, ^{90}Y, ^{241}Am, ^{139}Ce, ^{125}I, ^{32}P, ^{55}Fe and ^{133}Ba.

For γ emitters, a secondary standard radionuclide calibrator comprising a pressurized re-entrant ionization chamber (IC) is available. Radionuclide specific calibration factors are available for the following radionuclides: ^{139}Ce, ^{60}Co, ^{137}Cs, ^{131}I, ^{22}Na, ^{75}Se, ^{241}Am, ^{125}I, ^{192}Ir, ^{54}Mn, ^{90}Y, ^{65}Zn, ^{133}Ba, ^{109}Cd, ^{141}Ce, ^{57}Co, ^{58}Co, ^{51}Cr, ^{134}Cs, ^{152}Eu, ^{154}Eu, ^{59}Fe, ^{203}Hg, ^{123}I, ^{111}In, ^{99}Mo, ^{24}Na, ^{203}Pb, ^{46}Sc, ^{47}Sc, ^{113}Sn, ^{85}Sr, ^{99m}Tc, ^{201}Tl, ^{88}Y, ^{169}Yb and others. Sources can be prepared in a number of geometries, for example: point sources, liquid sources in ampoules, vials, bottles or Marinelli beakers. Solid water-equivalent sources can also be prepared in vials or Marinelli beakers.

Recent and planned research and development include the development of a simple counting technique to measure mixtures of two pure beta emitting radionuclides, efficiency calibration of the HPGe detector for a number of geometries and the development of a stable non-commercial liquid scintillation cocktail for possible use in the extended International Reference System (ESIR).

The CSIR-NML will host the International Committee for Radionuclide Metrology (ICRM) 2007 Conference in Cape Town from 3 to 7 September 2007. The goal of ICRM 2007 is to provide an opportunity for the exchange of information on techniques and applications of radionuclide metrology, and to encourage international cooperation in this field.

COURSES, MEETINGS AND CONSULTANCIES TO BE HELD DURING 2007

Courses and workshops

IAEA/ESTRO Teaching Course on Radiotherapy Treatment Planning Principles and Practice (RER/6/015), Dublin, Ireland, 25–29 March

IAEA/ESTRO Teaching Course on Dose Calculation and Verification for External Beam Therapy (RER/6/015), Budapest, Hungary, 29 April–3 May

IAEA/ESTRO Teaching Course on 3D Planning and Imaging – Russian edition (RER/6/015 & RER/6/0/16), St. Petersburg, Russian Federation, 22–25 August

IAEA/ESTRO Teaching Course on Evidenced based Radiation Oncology: Methodological Basis and Clinical Application (RER/6/016), Athens, Greece, 11–16 November

IAEA Training Course on Implementation of TRS-430 in Quality Assurance of Radiotherapy Treatment Planning Systems (RLA/6/051), Cartaqena, Colombia, 2–6 October

IAEA Regional (AFRA) Training Workshop on Commissioning of Linear Accelerators (RAF/6/031), Algiers, Algeria, 24–28 November

Regional (AFRA) Training Workshop on Brachytherapy Dosimetry and QA (RAF/6/031)[1]

Meetings and consultancies

Consultants Meeting on Potential Doctoral Coordinated Research Project (CRP) on Advanced Technologies in Radiotherapy, IAEA Headquarters, Vienna, Austria, 15–17 January

Consultants Meeting on Transition from Conventional to Conformal Radiotherapy, IAEA Headquarters, Vienna, Austria, 12–16 March

Research Coordination Meeting of the CRP on Testing of the Implementation of the Code of Practice for Dosimetry in X rays Diagnostic Radiology, IAEA Headquarters, Vienna, Austria, 21–25 May

Consultants Meeting to revise and update TRS-374, 'Calibration of Dosimeters used in Radiotherapy', IAEA Headquarters, Vienna, Austria, 18–22 June

Final Research Coordination Meeting of the CRP on Development of Procedures for Quality Assurance for Dosimetry Calculations in Radiotherapy, IAEA Headquarters, Vienna, Austria, 6–10 August

Consultants Meeting to prepare a Handbook for Diagnostic Radiology, IAEA Headquarters, Vienna, Austria, 27–31 August

Consultants Meeting on Calibration in Diagnostic X rays and Quality Control, IAEA Headquarters, Vienna, Austria, 10–14 September

Research Coordination Meeting of the CRP on Harmonization of Quality Assurance Practices for Nuclear Medicine Radioactivity Measurements, IAEA Headquarters, Vienna, Austria, 24–28 September[1]

Consultants Meeting to establish a new CRP on QA for Imaging in Radiotherapy, IAEA Headquarters, Vienna, Austria, 15–19 October

Research Coordination Meeting of the new CRP on Comprehensive Audits in Diagnostic Radiology, IAEA Headquarters, Vienna, Austria, 5–9 November

[1] Details on venue and dates to be provided.

MEMBER LABORATORIES OF THE IAEA/WHO NETWORK OF SSDLs[1]

Country	City	Contact person	Fax	E-mail
ALGERIA	Algiers	Mr. Mehenna Arib	+213 21 43 4280	mehenna.arib@ifrance.com
ARGENTINA	Buenos Aires	Ms. Margarita Saraví	+54 11 6779 8228	saravi@cae.cnea.gov.ar
AUSTRALIA	Menai	Mr. Dimitri Alexiev	+612 9717 3257	jbd@ansto.gov.au
AUSTRIA	Seibersdorf	Mr. Hannes Stadtmann	+43 2254 7802502	hannes.stadtmann@arcs.ac.at
BANGLADESH	Dhaka	Mr. Md. Shakilur Rahman	+ 8802 8613051	shakilurssdl@yahoo.com
BELARUS	Minsk	Mr. Valery Milevsky	+375 17 2130938	ion@belgim.belpak.minsk.by
BELGIUM	Ghent	Mr. Hubert Thierens	+32 92646699	hubert.thierens@rug.ac.be
BOLIVIA**	La Paz	Mr. Ismael Villca	+591 2 433063	ibten@caoba.entelnet.bo
BRAZIL	Rio de Janeiro	Mr. Carlos J. da Silva	+ 5521 2442 1605	carlos@ird.gov.br
BULGARIA	Sofia	Ms. Katya Sergieva	+359 2 9432 144	sergievakm@abv.bg
CANADA	Ottawa	Mr. Brian R. Gaulke	+1 613 9578698	brian_gaulke@hc-sc.gc.ca
CHILE	Santiago	Mr. Carlos Oyarzún Cortes	+56 2 27318723	coyarzun@gopher.cchen.cl
CHINA*	Beijing	Mr. Gan Zeuguei	+86 10 444304	
CHINA	TaiYuan, Shanxi	Mr. Zhang Qingli		zhangqing_li@hotmail.com
CHINA	Shanghai	Mr. Liu Shu-lin	+86 2164701810	simtt@stn.sh.cn
CHINA	Beijing	Mr. Li Kaibao	+86 10 62012501	kaibaoli@hotmail.com
CHINA	Hong Kong	Mr. C.L. Chan	+852 29586654	cchan@ha.org.hk
CHINA	Beijing	Mr. Guo Wen	+86 1 69357178	rmcssdl@iris.ciae.ac.cn
COLOMBIA	Bogotá	Mr. Uriel Chica Villegas	+57 1 3153059	uchica@ingeominas.gov.co
CUBA	Havana	Mr. Gonzalo Walwyn Salas	+537 579573	gonzalo@cphr.edu.cu
CYPRUS	Nicosia	Mr. Stelios Christofides	+357 2 801 773	cstelios@cytanet.com.cy
CZECH REP. *	Prague	Ms. I. Horakova	+4202 738330	ihorak@suro.cz
CZECH REP.	Prague	Mr. Pavel Dryák	+4202 66020 466	pdryak@cmi.cz
CZECH REP.	Prague	Mr. D. Olejár	+4202 67313119	dolejar@suro.cz
DENMARK	Herlev	Mr. Klaus Ennow	+45 44 543450	kln@sis.dk
ECUADOR	Quito	Mr. Marcos M. Frías Sánchez	+593 2 2563336	comecen1@comecenat.gov.ec
EGYPT	El-Giza	Mr. Mokhtar Sharaf	+20 2 386 7451	mokhtar_sharaf@yahoo.com
ETHIOPIA	Addis Ababa	Mr. Worku Wodaje	+251 1 62 04 95	nrpa@telecom.net.et
FINLAND	Helsinki	Mr. Antti Kosunen	+358 9 75988450	antti.kosunen@stuk.fi
FRANCE	Cedex	Ms. Isabelle Clairand	+33 1 47 46 97 77	isabelle.clairand@irsn.fr
GERMANY	Neuherberg	Mr. Dieter F. Regulla	+49893187192224	regulla@gsf.de
GERMANY	Freiburg	Mr. Christian Pychlau	+49 761 4905570	pychlau@ptw.de
GHANA	Legon-Accra	Mr. Joseph Kwabena Amoako	+233 21 400807	rpbgaec@ghana.com; joekamoako@yahoo.com.uk
GREECE	Paraskevi-Attiki	Mr. Costas J. Hourdakis	+30 210 650 67 48	khour@eeae.gr
GUATEMALA	Guatemala C. A.	Mr. Angel Osorio	+502 2 762007	arot23@yahoo.com
GEORGIA	Tbilisi	Mr. Simon Sukhishvili	+99 532 613500	simoniko@list.ru
HUNGARY*	Budapest	Mr. Istvan Csete	+36 1 2120147	icsete@omh.hu
HUNGARY	Budapest	Mr. Gabor Kontra	+36 1 2248620	kontra@oncol.hu
HUNGARY	Paks	Mr. Mihaly Orbán	+36 1 3551332	orbanmi@npp.hu
INDIA	Mumbay	Mr. Shri Suresh Rao	+91 22 2550 5151	suresh@barc.gov.in
INDONESIA	Jakarta Selatan	Mr. Susetyo Trijoko	+621 21 7657950	strijoko@batan.go.id
IRAN, ISLAMIC REPUBLIC OF	Karaj	Mr. Mostafa Ghafoori	+98261 4411106	mghafoori@nrcam.org
IRELAND	Dublin	Ms. Lorraine Currivan	+353 12697437	rpii@rpii.ie
ISRAEL	Yavne	Mr. Ben Shlomo	+972 8 9434696	abenshlomo@hotmail.com

KOREA, REP. OF	Seoul	Mr. Heon-Jin Oh	+82-2-380-1352	radjin@kfda.go.kr
KUWAIT	Kuwait City	Ms. Ilham Elfares	+965 4862537	ssyyy12@yahoo.com
LATVIA	Salaspils	Mr. Antons Lapenas	+371 790 1210	alap@latnet.lv
LIBYAN ARAB JAMAHIRIYA	Tripoli	Mr. Saleh A. Ben Giaber	+218 21 3614143	BenGiaber@yahoo.com
MADAGASCAR	Antananarivo	Mr. Raoelina Andriambololona	+261 202 235583	instn@dts.mg
MALAYSIA	Kajang	Mr. Taiman Bin Kadni	+603 892 50575	taiman@mint.gov.my
MEXICO	Mexico, D. F.	Mr. Victor M. Tovar Munoz	+52 55 3297302	vmtm@nuclear.inin.mx
NORWAY	Osteras	Mr. Hans Bjerke	+47 67 147407	Hans.Bjerke@nrpa.no
PAKISTAN	Islamabad	Mr. Waheed Arshed	+92 51 9290275	warshed@pinstech.org.pk
PERU	Lima	Mr. Tony Benavente A.	+51 1 488 5101	tbenavente@ipen.gob.pe
PHILIPPINES*	Diliman, Quezon	Ms. Estrella S. Caseria	+63 2 9201646	escaseria@pnri.dost.gov.ph
PHILIPPINES	Sta. Cruz, Manila	Ms. Nieva O. Lingatong	+632 711 6016	nolingatong@doh.gov.ph
POLAND	Warsaw	Mr. Wojciech Bulski	+48 22 6449182	w.bulski@rth.coi.waw.pl
PORTUGAL	Sacavém	Mr. J.A. Ferro de Carvalho	+351 21 9941995	aferroc@itn.pt
PORTUGAL	Lisbon	Mr. Paulo Ferreira	+351 21 7229877	radfisica@ipolisboa.min-saude.pt
ROMANIA	Bucharest	Mr. Constantin Milu	+40 21 3183635	cmilu@ispb.ro
RUSSIAN FED.	St. Petersburg	Mr. V.I. Fominykh	+7 812 323-96-17	info2101@vniim.ru
RUSSIAN FED.	St. Petersburg	Mr. G. Lutina	+7 812 596-6705	crirr@peterlink.ru
SAUDI ARABIA	Riyadh	Mr. Abdalla N. Al-Haj	+9661 4424777	abdal@kfshrc.edu.sa
SERBIA	Belgrade	Mr. Milojko Kovačević	+381 11 2455943	milojko@vin.bg.ac.yu
SINGAPORE*	Singapore	Mr. Eng Wee Hua	+ 65 7384468	
SINGAPORE	Singapore	Mr. Stephen Chong	+65 2262353	sckmipil@pacific.net.sg
SINGAPORE	Singapore	Mr V.K. Sethi	+65 2228675	trdwac@nccs.com.sg
SLOVENIA	Ljubljana	Matjaz Stuhec	+386 1 477 38 41	matjaz.stuhec@ijs.si
SLOVAKIA	Bratislava	Ms. Viera Laginová	+421 2 52923711	vlaginov@ousa.sk
SOUTH AFRICA	Pretoria	Ms. Zakithi Msimang	+27 12 841-2131/4458	zmsimang@csir.co.za
SUDAN**	Khartoum	Mr. Mamdouh Osman	+249 11774179	mamdouhyas@hotmail.com
SWEDEN	Stockholm	Mr. Jan-Erik Grindborg	+46 8 7297108	ssi@ssi.se
SYRIAN ARAB REPUBLIC	Damascus	Mr. M. Takeyeddin	+963 116112289	atomic@aec.org.sy
TANZANIA, UNITED REP. OF	Arusha	Mr. Wilbroad E. Muhogora	+255 27 2509709	taec@habari.co.tz
THAILAND*	Bangkok	Mr. Kriengsak Bhadrakom	+66 2 5806013	
THAILAND	Bangkok	Mr. Siri Srimanoroth	+66 2 2239595	siri@dmsc.moph.go.th
THAILAND	Bangkok	Ms. Wimann Thongmitr	+66 2 5613013	wimann@oaep.go.th
TURKEY	Istanbul	Mr. Ata Türer	+90 212 5482234	dogan.yasar@taek.gov.tr
TUNISIA	Tunis	Ms. Latifa Ben Omrane	+216 71 571697	sadok.mtimet@rns.tn
URUGUAY	Montevideo	Mr. Alejandro San Pedro	+598 2 9021619	calibraciones@dinaten.miem.gub.uy
VENEZUELA	Caracas	Ms. Lila Carrizales	+58 212 5041577	lcarriza@ivic.ve
VIETNAM	Hanoi	Mr. Dang Duc Nhan	+84 4 8363295	ddnhan@mail.vaec.gov.vn

** Provisional Network members
* SSDL Organization

[1] Kindly notify the Dosimetry and Medical Radiation Physics Section of any change or correction.

COLLABORATING ORGANIZATIONS ASSOCIATED WITH THE IAEA/WHO NETWORK OF SSDLs

International Bureau of Weights and Measures (BIPM)
International Commission on Radiation Units and Measurements (ICRU)
International Electrotechnical Commission (IEC)
Organisation Internationale de Métrologie Légale (OIML)
International Organization of Medical Physics (IOMP)

AFFILIATED MEMBERS OF THE IAEA/WHO NETWORK OF SSDLs

Bundesamt für Eich und Vermessungswesen (BEV)	Vienna, AUSTRIA
Australian Radiation Protection & Nuclear Safety Agency (ARPANSA)	Yallambie, AUSTRALIA
National Research Council (NRC)	Ottawa, CANADA
Laboratoire National Henri Becquerel (LNHB)	Gif-sur-Yvette, , FRANCE
Physikalisch-Technische Bundesanstalt (PTB)	Braunschweig, GERMANY
National Office of Measures (OMH)	Budapest, HUNGARY
Ente per le Nuove Tecnologie L'Energia e L'Ambiente (ENEA)	Rome, ITALY
Electrotechnical Laboratory (ETL)	Ibaraki, JAPAN
NMi Van Swinden Laboratorium	Delft, NETHERLANDS
Rijks Institut voor Volksgesundheid (RIVM)	Bilhoven, NETHERLANDS
National Radiation Laboratory (NRL)	Christchurch, NEW ZEALAND
Scientific Research Institute for Physical-Technical and Radiotechnical Measurements (VNIIFTRI)	Moscow, RUSSIAN FEDERATION
Laboratory of Ionizing Radiation, Slovak Institute of Metrology (SIM)	Bratislava, SLOVAKIA
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT)	Madrid, SPAIN
National Physical Laboratory (NPL)	Teddington, UNITED KINGDOM
National Institute of Standards and Technology (NIST)	Gaithersburg, UNITED STATES OF AMERICA

IAEA
International Atomic Energy Agency

SSDL Newsletter
No. 53

07-07071

Wagramer Strasse 5, P.O. Box 100,
A-1400 Vienna, Austria

The SSDL Newsletter is prepared twice a year by the Joint IAEA/WHO Secretariat of the SSDL Network.
Printed by the IAEA in Austria, January 2007.