

Report to the 17th meeting of the CCRI (I), May 2005

Recent activities in radiation dosimetry at the CSIR-National Metrology Laboratory

Jaco Mostert, Zakithi Msimang
CSIR-NML Ionising Radiation Laboratory

Introduction

The Ionising Radiation Laboratory of the CSIR-National Metrology Laboratories maintains national measuring standards in the field of radiation dosimetry. Through these standards, the laboratory supports radiation therapy and radiation protection in South Africa and the Southern African region.

Currently all standards maintained by the laboratory are secondary standards with traceability to primary standards at the BIPM (air kerma and absorbed dose to water) and the PTB (absorbed dose to tissue for $^{90}\text{Sr}/^{90}\text{Y}$ and ^{85}Kr beta radiation).

Standard for Absorbed dose to water in ^{60}Co gamma radiation

A NE 2611 chamber calibrated in terms of absorbed dose to water is used to maintain the standard for absorbed dose to water in ^{60}Co gamma radiation. The chamber was calibrated at the BIPM in 2001 and will be calibrated again at the BIPM in 2005.

The laboratory has adopted the IAEA TRS398 protocol as the basis for the maintenance and dissemination of traceability for absorbed dose to water. A staff member of the laboratory, Ms Zakithi Msimang attended the IAEA workshop on the implementation of the TRS 398 protocol in Tunisia in 2002.

Standard for Air kerma in ^{60}Co gamma radiation and medium energy X-rays

The same NE 2611 chamber is calibrated in terms of air kerma in ^{60}Co and medium energy X-rays (50 kV– 250 kV) and is used to maintain the standard for air kerma. The chamber was calibrated at the BIPM in 2001 and will be calibrated again at the BIPM in 2005

Standard for absorbed dose to tissue in $^{90}\text{Sr}/^{90}\text{Y}$ and ^{85}Kr beta radiation

Two beta sources used with beam flattening filters in a NPL beta irradiation rig are used to maintain the standard for absorbed dose to tissue in $^{90}\text{Sr}/^{90}\text{Y}$ and ^{85}Kr beta radiation. The two sources were calibrated at the PTB in 2003.

Protection level air kerma standards for ^{60}Co , ^{137}Cs and ^{241}Am

A NE 2530 (35 cc) and a PTW 32002 (1000 cc) ionization chamber are used to maintain standards for air kerma in ^{60}Co , ^{137}Cs and ^{241}Am at protection level rates. Calibration factors for these chambers in ^{60}Co are obtained through calibration against the therapy air kerma level standard. Factors for ^{137}Cs and ^{241}Am are obtained through calibration against the therapy air kerma standard in medium energy X-rays and ^{60}Co and then interpolating for the relevant energy.

The NE 2530 chamber will be calibrated by the BIPM in 2005 in terms of air kerma in ^{137}Cs gamma radiation.

Intercomparisons

APMP.RI(I)-K1 Measurement of air kerma for Cobalt 60, 2004-2005

APMP.RI(I)-K3 Measurement of air kerma for medium energy x-rays, 2000 – 2002

APMP.RI(I)-K4 Measurement of absorbed dose to water for Cobalt 60, 1999 - 2000

Accreditation

The Ionising Radiation Laboratory was accredited in 2003 for parameters covering air kerma (Therapy level ^{60}Co , medium energy x-rays and protection level ^{60}Co , ^{137}Cs and ^{241}Am), absorbed dose to water (therapy level ^{60}Co) and absorbed dose to tissue ($^{90}\text{Sr}/^{90}\text{Y}$ and ^{85}Kr beta radiation) by the South African National Accreditation Service (SANAS)

IAEA SSDL Activities

The CSIR-NML has been a member of the IAEA Secondary Standards Dosimetry Laboratory (SSDL) network since 2001. As a member of the SSDL network, the laboratory has been taking part in the annual TLD audit and has had the opportunity to send laboratory staff members for workshops and training fellowships organized by the IAEA.

The SSDL has applied to become a regional designated centre in the field of dosimetry and has been subjected to an audit by an IAEA appointed technical expert in 2004. The evaluation of this application is currently in progress.

Recently, the SSDL has started a technical cooperation project supported by the IAEA for the development of dosimetry standards applicable to diagnostic radiology levels.

Publications

Mostert J, An overview of the facilities of the Ionising Radiation Laboratory, South Africa, IAEA SSDL Newsletter No. 46, 2002