AN OVERVIEW OF THE FACILITIES OF THE IONIZING RADIATION LABORATORY, SOUTH AFRICA

J.C. Mostert

Ionising Radiation Laboratory
CSIR-National Metrology Laboratory
South Africa

1. INTRODUCTION

The Ionising Radiation Laboratory (IRL) of the CSIR-National Metrology Laboratory (NML) in South Africa was recently accepted as a member of the IAEA SSDL network. This article gives a very brief overview of the services and facilities provided by this laboratory.

The NML has the responsibility to realize and maintain the national measuring standards in South Africa. In the field of ionizing radiation, this function is performed by the IRL.

The IRL provides traceability through its calibration and measurement services for regulatory authorities, institutions providing radiation therapy services such as hospitals and other oncology centres, radiation protection service providers such as the South African Bureau of Standards (SABS), the radiation protection industry in general and to companies providing industrial quality assurance services. These services also extend to a number of countries in the Southern African Development Community (SADC) which do not currently have metrology facilities of their own.

2. FACILITIES

2.1 Standards for radiation therapy

The IRL maintains the South African national measurement standards for air kerma in Co-60 radiation and X-rays as well as for absorbed dose to water in Co-60 radiation. These standards are based on measurements made with a secondary standard that consist of an electrometer and ionization chamber whose calibration coefficients are traceable to the National Physical Laboratory (NPL) in the UK.

The ionization chamber is used to calibrate a set of working standards, in accordance with accepted quality assurance principles, which in turn are used to calibrate secondary standards belonging to the different radiation therapy centres.

2.2 Standards for radiation protection

Air kerma standards are used to calibrate radiation beams from Cs-137, Co-60 and Am-241 sources. These calibrated fields are then used to calibrate gamma ray survey meters and personal dosimeters used in the radiation protection field. The calibrated fields are also used to irradiate TLD's to specific doses for institutions operating TLD based radiation protection services, such as the SABS.

The IRL also maintains a set of neutron sources that are calibrated in terms of fluence rate at the NPL. These are used to calibrate neutron sensitive devices and to irradiate neutron sensitive TLDs to specific doses.

In addition to gamma and neutron radiation standards, a beta irradiation facility with two standard sources with traceability to the NPL is maintained. This is used primarily for the irradiation of TLDs.

2.3 Activity standards

In addition to the dosimetry standards maintained by the IRL, a set of surface activity standards and a radon progeny activity concentration standard are maintained.

The surface activity standards consist of a set of four extended area sources (Am-241, Sr-90, Cl-36 and C-14) of which the surface emission rates are traceable to the NPL. These are used to calibrate other extended area sources in terms of surface emission rate using a gas flow window counter. Calibrated extended area sources are used to calibrate contamination monitors that are used primarily in the radiation protection field.

A large radon chamber houses a radon progeny sampling and measuring system. This facility is used for the calibration of radon progeny measuring devices that are used in radiation protection. These monitors are used extensively in South African gold mines to monitor radon and radon progeny levels.

3. COMPARISONS

As part of the NML's comparison programme, the IRL participates regularly in international and regional comparisons to ensure it's continuing competence and equivalence to other international facilities. The laboratory recently participated in the Asia-Pacific Metrology Program (APMP)

comparison for absorbed dose to water and several other comparisons are currently in progress.

4. QUALITY SYSTEM

Due to the importance of accurate and traceable calibrations of ionizing radiation equipment, the IRL is currently in the process of implementing ISO/IEC 17025 guidelines. The conclusion of this process will be an assessment by the South African National Accreditation Service (SANAS), during which the technical activities of the laboratory will be subjected to review by international experts. This process is expected to be completed by the end of 2003.

5. MORE INFORMATION

More information on the activities and capabilities of the CSIR-NML and the IRL may be obtained from the world wide web at www.csir.nml.co.za