ANSTO Report to the CCRI(II) meeting 2005

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INTRODUCTION

The Radiation Standards Project at ANSTO develops, maintains and disseminates the Australian Primary and Secondary Standards of measurement for radioactivity as well as a Secondary Standard for Radiation Dosimetry, which is traceable to the Primary Standard maintained by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). The project establishes a traceability program for Australian radiopharmaceutical industries and hospitals.

1. Personnel

The present staff allocation to the project is 2.5.

2. Laboratories and equipment

There are three laboratories: Primary Standard Activity laboratory, Secondary Standards Activity Laboratory and Secondary Standard Dosimetry Laboratory. These laboratories are equipped with

Primary Standard Activity Laboratory

1) Analogue $4\pi\beta-\gamma$ coincidence counting system.

2) Digital $4\pi\beta-\gamma$ coincidence counting system.

3) ORTEC Si(Li)-based $\beta-$spectrometer.

4) 3 High purity Germanium detectors.

5) $\alpha-$spectrometer (cooled Si surface barrier).

Secondary Standard Activity Laboratory

6) Pressurised TPA ionisation chamber connected to Keithley 6517A electrometer.

7) Vinten ionisation chamber connected to Keithley 6517A electrometer.

8) Source preparation facilities.

Secondary Standard Dosimetry Laboratory

9) 90 TBq cobalt-60 teletherapy source mounted in an AECL "Eldorado" unit.

10) 2 NE 2561 standard thimble chambers.

11) 2 NE 2611A standard thimble chambers.

12) 1 NE 2571 thimble chamber.

13) 1 Standard Keithley 35040 dosimeter.

14) A working Keithley 35040 dosimeter.

15) A working Keithley 6517A electrometer.

16) Standard Imaging HDR-1000 Plus well type ionisation chamber.

3. Work performed in the past two years

1) Developed activity standard for SIR-spheres®, a radiopharmaceutical product comprised of Y-90 microspheres suspended in sterile, pyrogen-free water for injection into patients. The standard was developed by converting the activity standard for Y-90 solution through a chemical digestion of Y-90 microspheres. The standardisation of Y-90 solution was performed at NIST using CIEMAT/NIST method and at CSIR-NML using the TDCR method.

2) Performed annual traceability calibration for ANSTO Radiopharmaceuticals and Industrials (ARI) for radiopharmaceuticals I-131, Ga-67, Tl-201, Tc-99m and F-18.

3) Various reference standard sources were supplied to internal and external customers.

4) Photon emission rate and activities were measured on the customer-supplied materials using beta and gamma spectrometers.

5) Developed secondary dosimetry standard for air kerma measurement of I-125 brachytherapy seeds (Model 6711) with traceability to NIST primary standard.

6) Participated in an IAEA coordinated TLD dose audit with accuracy to within 1% demonstrated.

7) Calibrated therapy level of ionisation chambers for hospitals.

8) Submitted ^{153}Sm solution, standardised by $4\pi\beta(PC)-\gamma$ coincidence counting technique, to SIR for comparison.

4. Current and future work

1) Construction of TDCR liquid scintillation systems.

2) Development of Au-198 foil activity standard for the flux measurement of ANSTO Replacement Research Reactor (RRR).

3) Calibration of hospital ionisation chambers for the air kerma measurement of I-125 brachytherapy seeds.

4) Building a high pressure 4π proportional counter for use in 4πβ-γ coincidence counting (a constant flow atmospheric pressure chamber is presently in use).

5) A second ionisation chamber setup to support existing chamber for radioactivity measurement.

6) Continuing annual traceability calibration program for ARI for I-131, Ga-67, Tl-201, Tc-99m and F-18.

7) Continuing provision of dosimetry standard to hospitals and participation in the annual IAEA coordinated TLD dose audit.

8) Development of reference dosimetry system using polymer gels.

5. Laboratory visit

As ANSTO is constructing a TDCR system, Ms Li Mo has been sent to France to receive training on the TDCR method at CEA-LNHB and Ionizing Radiation Section at BIPM from November 2004 to May 2005.