NIM Report to the CCRI (II) Meeting 2007

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1. Introduction

The Institute of Ionizing Radiation and Medical Engineering Metrology is one of the state level sub-institutes under National Institute of Metrology (NIM). Its role is to support the development of China industry, science and technology by providing primary and measurement standards and services in the fields of ionizing radiation and medical engineering.

The principal activities of the Division of Metrology in Ionizing Radiation are to develop national measurement standards used in fields of ionizing radiation, medical metrology and participate in international comparisons to maintain their international consistency. The division also carries out calibrations and testing for various measuring instruments in these fields, whose accuracy is highly required by medical applications that are tightly connected with human health and safety.

In the field of ionizing radiation, research is conducted on areas of radioactivity, radiation

dosimetry, radiation processing and neutron metrology. In terms of medical metrology, the Division has established national primary standards used in radiation diagnostic imaging, radiation oncology, nuclear medicine so on.

2. Laboratories and equipment

There are three Laboratories: Primary Standard Radioactivity measurement laboratory; Primary Standard Radiation dosimetry laboratory, Primary Standard neutron measurement laboratory. These Laboratories are equipment with:

Primary Standard Radioactivity measurement laboratory

1) Primary Standard of 4πx(PPC)-γ Coincidence counting system

2) Primary Standard of Digital 4πβ(PPC)-γ Coincidence counting system

3) Primary Standard of 4πβ（LS）Counter

4) Primary Standard of 4πβ（LS）-γ Coincidence Counter

5) Primary Standard of 2πα/β Particle Emission Rate

6) Radioactivity Primary Standard of Low Level 4πα、4πβ

7) The National Standard of 4πγ Ionizing Chamber

8) The National Standard of ^{222}Radon Measurement System

9) The High purity germanium γ Spectrometer National Standard

Radiation dosimetry laboratory

1) Primary Standard of Medium Energy X-ray Exposure

2) The Free Air Chambers

3) The primary standard for air kerma in gamma radiation

4) The graphite cavity chamber (volume 30cm^3) and measure system of mini-current.

5) The Ferrous sulfate (Fricke) dosimeter measure Absorbed dose to water

6) The Personal dosimeter (TLD) Measurement System

Primary Standard neutron measurement laboratory

1) Neutron emission rate

2) Ambient dose equivalent rate

3. International comparisons

1) The division has participated in CCRI organized comparisons of measurement of absorbed dose to water, activity concentration of the same Cd-109 solution, the same Cs-134, Cs-137, Eu-152, Fe-55, I-125, Se-75 and Sr-89 solution. The division also participated in APMP comparisons of measurement activity of radionuclide Ba-133, Ce-139, Co-58, Ho-166m and Y-88.

2) The division also participated in APMP comparisons of measurement of air kerma for Cobalt 60,

3) Key comparison BIPM.RI(I)-K3 of the air-kerma standards of the NIM and the BIPM in medium-energy x-rays.

4) Key comparison BIPM.RI(I)-K3 of the air-kerma standards of the NIM and the BIPM in Co-60 γ-rays.

4. Work performed in the past two years

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

2) participated Ba-133 international comparisons

3) participated Fe-55 international comparisons

4) Construction of Low energy X-rays standards

5．Current and Future Research areas and subjects

- Ionizing radiation

  Including develop standards and testing methods concerning radioactivity measurement, radiation dosimetry, radiation processing and neutron metrology.

  1) Construction of TDCR Liquid scintillation systems

  2) testing methods concerning radioactivity measurement of Medical radionuclide.

- medical engineering

  Including the research on metrology technologies and tracing methods in the field of medical diagnoses and therapies.

- industry.

  Including the research on metrology technologies and tracing methods in the field of industry.