



# National and International Standardization of Radiation Dosimetry

The deliberations of the conference mainly dealt with the following five subjects:

- Standardization in primary standardizing laboratories,
- Standardization in Secondary Standard Dosimetry Laboratories (SSDLs),
- Standardization in personnel dosimetry,
- Basic physical data,
- International activities, including dose intercomparisons.

## **Standardization in primary standardizing laboratories**

Representatives of six national standardizing laboratories (France, FRG, Japan, Hungary, UK, USA) reported on current work in the field of standardization in dosimetry. It became clear that world-wide standardization has been achieved concerning instrumentation and working procedures. Ionization chambers (free air chambers, extrapolation chambers, cavity chambers), absorbed dose calorimeters, and chemical systems (especially ferrous sulfate) are all being used as the basic element in primary standardization. The overall accuracy of the various national standards is checked by intercomparisons among these laboratories and between them and the BIPM (Bureau international des poids et mesures). Those working in the national standardizing laboratories exhibit a high professional competence and an increasing awareness of the needs of the users of ionizing radiation. Increasing concern is given to work beyond calibration of secondary standards, i.e., to work directed to assist in practical use of dosimeters by providing proper conversion and correction factors.

## **Standardization in SSDLs**

It seems worthwhile to mention that this symposium was the first open meeting where the activities of the newly established SSDLs were discussed, and two sessions were devoted to this subject. Of the 13 papers on SSDL activities, 9 were from SSDLs in operation (Austria, Brazil, India, UK, USA, IAEA). It is now obvious that the SSDLs, and the international IAEA/WHO Network of SSDLs have become recognized institutions with a necessary and well-defined objective. Their close links to both the users of radiation and the primary standardization laboratories gives them a unique and important position within the metrology system.

A number of SSDLs are already well organized and have started to develop local and regional dose intercomparison programmes following IAEA recommendations. In India,

for example, considerable improvement in clinical dosimetry was achieved through a dose intercomparison programme organized by the Indian SSDL.

### **Standardization in personnel dosimetry**

In the general area of personnel monitoring, the accuracy requirements have been greatly relaxed. It was reported that recent recommendations propose  $\pm 50\%$  for the accuracy of measurement in the low dose range. However, this is for a standardized irradiation geometry. Under actual field conditions, the accuracy can be much less as, for example, the detector's position relative to the body may vary from less than one centimetre to more than five centimetres, and there can be significant angular and spectral dependence. For this application of detectors the emphasis should be on calibration and intercomparisons under as realistic field conditions as practical.

### **Basic physical data**

In the study of basic physics phenomena related to dosimetry, some excellent data were reported. It is imperative that this work continues because, without it, real progress on basic dosimetry studies cannot be made. This work becomes even more important as, in connection with the change to the SI units, the radiological concept of exposure may eventually become phased out and be replaced by an absorbed energy quantity (e.g. air-kerma). Consequently, the quantity  $W$  (i.e. the average energy required to produce an ion pair) will enter into the calibration process, requiring international standardization of the numerical values. Extensive work was reported by staff from the U.S. National Bureau of Standards on the computation and compilation of standard cross section data and absorbed dose distributions for photon and electron dosimetry.

### **International activities**

Representatives from the ICRU (International Commission on Radiation Units and Measurements), the EEC and the IAEA reported on related activities of their organizations. ICRU, in particular, has been deeply involved in standardizing radiological quantities and units and measuring procedures. It also serves as a collaborating member to the IAEA/WHO Network of SSDLs. The results of an X-ray intercomparison study within the EEC were discussed and it was concluded that repeated intercomparisons in this field are needed even in the highly industrialized countries.