Progress Report on the Radiation Dosimetry at MKEH

István Csete, Hungarian Trade Licensing Office (MKEH)
Metrology Department, Budapest, Hungary

Organisation

- After the merging of OMH into the Hungarian Trade Licensing Office in 2007 its Metrology Department, as Hungarian NMI, has remained responsible for maintaining the 22 national standards. The department has 30 graduated staff members including the 7 dealing with ionising radiation. There was no change in the 4 dosimetry staff and working environmental since last report.

Photon dosimetry

- A low dose rate 4 π solid angle uniform irradiation facility was developed in the range of 40 nSv/h- 300 nSv/h ambient dose equivalent rate using ^{137}Cs sources in a low background 1m^3 volume chamber. The photon spectrum needs further investigation. The actual uncertainty of the H*(10) reference values is u_c=7%
- The MKEH coordinated EURAMET project No. 813 has been completed. This was a double regional EUROMET.RI(I)-K1 and EUROMET.RI(I)-K4 key comparisons. The high stability transfer instruments enabled the 26 participants to establish their degrees of equivalence, DoE, of their national standards for air kerma (K_{air}) and absorbed dose to water (D_w) in ^{60}Co therapy beam. The new 11 K_{air} and new 14 D_w DoE values are able to support the relevant CMC claims of the participants. The average calibration coefficient values used for DOE calculations, conveyed the values to be within the expanded uncertainty of DoE of each participant for both quantities, except in three cases for air kerma. These systematic deviations (+0.5%) between CCO-1 type standards used at BEV, MKEH, PTB, SMU and the BIPM air kerma standard (pancake chamber) ,being accepted for realising the SI values, need further consideration.
- The calibration of hospital's reference therapy chambers for high energy photon beams in term of absorbed dose to water, instead of using ^{60}Co beam +k_Q factors technique, is going to be started. It will be available in the range of (0.638-0.785) $TPR_{20,10}$ values to be performed at the hospitals' beams combined with beam quality check measurements. The national standard of absorbed dose to water will be traceable to a foreign water calorimeter instead of our primary standard graphite calorimeter, since there is no resource to maintain it in the future.

Legal metrology

- Type test of BIT RS 04H, RS 04L, MGP GIM 202-1 environmental monitors, Canberra MRAD 101 and Victoreen 451B survey meters have been performed on the basis of the relevant IEC standards.
- The biannual verifications of survey meters, EPDs and environmental monitors being used in Hungary are the most significant part of the workload of the dosimetry team. Reference irradiations and performance tests for the Hungarian personal dosimetry service have also been carrying out.

Quality assurance

- All the CMC claims of MKEH (104 IR lines among them) suspended on 28 March due to the lack of QMS re-evaluation presentation at the EURAMET TC Q meeting 18 February 2008. After the successful presentation of it all claims reinstituted in March 2009.

International activities

- The air kerma irradiations of TLDs for the IAEA SSDL service have been continued.
- BIPM.RI.K-5 and BIPM.RI.K-3 key comparisons of MKEH is scheduled in 2010
- Coordination of EURAMET.RI.K-5 key comparison extending the air kerma rate down to (100-300) nGy/h of ^{137}Cs beam is under consideration.

Publications

1. Csete I. Calibration of X-ray diagnostic instruments.(Conference on QA in X-ray Diagnostic in Hungary 2007)
2. Csete I. Uncertainty calculation of ambient dose equivalent measurements . (Online Hungarian Radiation Prodection periodical www.sugarvedelem.hu .2008)
3. L Büermann, I Csete.et al. Comparison of national air kerma standards for ISO 4037 narrow spectrum series in the range 30kVto 300kV (Metrologia, 45. 2008)
4. I Csete et. al. Comparison of air kerma and absorbed dose to water measurements of Co-60 radiation in radiotherapy. (EURAMET report 813 2009)

Budapest, April 2009.