

AbstractID: 9011 Title: Comparison of two photon dosimetry protocols: AAPM TG-51 & IPSM 1990.

**Purpose.** A comparison of two dosimetry codes of practice for photon therapy beams was performed. These codes of practice are: AAPM TG-51 and IPSM 1990. Both protocols are based on standards of absorbed dose to water. This comparison was carried out for five beam qualities with nominal energies: 4 MV, 6 MV, 8 MV, 10 MV and 18 MV.

**Methods and Materials.** The photon beams were generated by two Elekta Synergy and two Elekta Precise linear accelerators. A PTW MP3 plotting tank was used for relative and absolute measurements. A PTW 31002 thimble chamber was utilized for relative measurements. A NE 2571 Farmer graphite chamber was chosen for absolute dose measurements. A Keithley Therapy 35040 electrometer was used for absolute measurements and a PTW Tandem for relative ones. All measurements are traceable to National Physical Laboratory (UK) dose standards. Absolute dose was measured at 5 cm deep and 7 cm deep (for 18 MV) according to IPSM 1990 and at 10 cm deep for AAPM TG-51. All correction factors (polarity and recombination) were computed using measurements performed at the recommended depths and following each protocol.

**Results.** Values for all correction and calibration factors were obtained by measurement or computation.  $N_{D,w}$  calibration factors provided by NPL for each quality were used for IPSM 1990; in the case of AAPM TG-51, its method using  $N_{D,w}$  for Co-60 and tabulated  $k_q$  factors was applied. AAPM TG-51 and IPSM 1990 absolute dose results lie within 0.6%, which falls within uncertainty limits.

**Conclusion.** A comprehensive absolute dose study was performed according to two protocols: beam quality indexes, correction factors and dose measurements. A complete uncertainty analysis was carried out for all experimental results, according to ISO GUM standards of practice. Results show that absorbed dose to water according to both protocols agrees within uncertainty.