AbstractID: 1711 Title: The Effect of Wedge Filters on Megavoltage Beam Quality with respect to Absorbed Dose Determination.

Radiotherapy dosimetry for megavoltage X-ray beams in the UK is traceable, via graphite-walled NE2561 ionisation chambers, to a calorimetric standard of absorbed dose. Secondary standards are calibrated, in terms of absorbed dose to water, as a function of the beam quality parameter tissue phantom ratio (TPR).

The insertion of a wedge filter into the beam reduces the dose rate and tends to harden the beam. The change in dose rate reduces ion recombination, tending to decrease the measured dose. The TPR-dependence is such that the wedge should decrease the chamber calibration factor, though the change in photon spectrum may be such that TPR is inadequate as a beam quality parameter.

We investigated the effect of a 60^{o} wedge filter on three beams produced by Elekta SLi series linear accelerators at 6MV (TPR =0.683), 8MV (0.710) and 10MV (0.736). Beam hardening increases the respective TPRs to 0.704, 0.728 and 0.747, while the dose rate falls to approximately 25% of the unwedged value. A lead attenuation index (LAI) was measured as an indicator of spectral effects.

Including the effects of ion recombination, the net effect at 6MV of introducing the wedge on measured dose using the TPR-dependent calibration reported by NPL is a decrease of 0.7 %. After using LAI values to allow for spectral effects, this decrease is reduced to 0.4 %. The effect of ion recombination in both cases is 0.3 %. Other energies investigated demonstrate similar differences.