AbstractID: 6728 Title: Indications of Effective Depth Reversal for Cylindrical Ion Chambers in Electron Beams

Purpose: Cylindrical ionization chamber measurements of electron beam depth dose are corrected for the effective depth of measurement and water/air stopping power ratio. The purpose of this presentation is to examine whether a unidirectional upstream shift from physical to effective depth of measurement as often used in data acquisition systems makes sense.

Method and Materials: Ionization chamber measurements of depth dose corrected for effective depth by a unidirectional shift and water/air stopping power ratio at depth are compared with diode and EBT film measurements for standard electron beam cone sizes over the nominal energy range of 6 MeV to 20 MeV. The diode results are obtained with a NIST traceable electrometer and are used without correction for any change in water/silicon stopping power ratio *vs* depth. The EBT film density is converted to dose based on a characteristic curve from films exposed in plastic water at the nominal depth of dose maximum. EBT film results are used without additional corrections for any change in water/EBT film stopping power ratio *vs* depth. The EBT film density is evaluated with a pin-hole densitometer as well as a VIDAR film scanner.

Results: Good agreement of all measurements at depth from 80 to 10 percent suggest ignoring variation in stopping power ratio for both diode and EBT film has little impact on the results. Both diode and film suggest a slightly deeper depth of dose maximum and a more rapid drop in dose from D_{max} towards the surface.

Conclusion: Agreement between ionization chamber results and the high resolution solid detector results would improve if the shift in the effective depth of measurement of the ionization chamber is based on dose gradient and reverses as the gradient reverses with perhaps no shift at the zero gradient position. This may impact on calibration protocols.