AbstractID: 3681 Title: The dosimetric characterization of the performance of the One Dose MOSFET dosimeter in the buildup region of a 6 MV photon beam

Purpose: To characterize the performance of the One Dose MOSFET dosimeter in the buildup region of a 6 MV photon beam.

Methods and Materials: The depth dose curve in the buildup region was measured in a polystyrene phantom using One Dose MOSFETs, a PTW parallel-plane (p-p) ion chamber, and thermoluminescent dosimeters (TLD) (rectangular chips 0.5 mm thick). The One Dose MOSFET dosimeters were pre-calibrated in a Cobalt beam under full build-up conditions. Calibration factors were supplied by the manufacturer and auto-corrections applied for SSD, field size and modality. Our polystyrene phantom was arraigned so that intermediate thickness of material was applied to the surface without changing the SSD (100 cm). Surface dose measurements were made with the MOSFET and TLD placed directly on the phantom. Radiochromic (RC) film, approximately 0.25 mm thick, was used for fine-step measurements for the first few sub-millimeter steps from the surface. The percentage depth doses (PDD's) were measured to a depth of 5 cm.

Results: The measured relative depth doses were normalized at their respective maxima. The TLD's and One Dose MOSFETs over-estimated doses at very shallow depths compared to the p-p chamber. The thermoluminescent dosimeters approximated the shallow depth dose better than the One Dose dosimeter. There was a plateau present in the TLD and MOSFET PDD data close to the surface, suggesting an inherent dosimeter buildup thickness of approximately 0.5 and 1.5 mm respectively. Beyond this region, there was good agreement of the three dosimeters in representing the PDD characteristics of a 6 MV photon beam.

Conclusions: The One Dose MOSFET system can clinically represent the dose under appropriate buildup conditions but overestimates the surface and sub-surface (< 1.5 mm) doses.