

AbstractID: 11297 Title: Prototype Electron Phantom for Radiographic and Radiochromic Film Dosimetry

Purpose: To develop a practical electron beam phantom for use with radiographic and radiochromic film to measure relative dose in a plane containing the central axis.

Method and Materials: A prototype Solid Water[®] film phantom was used to measure 2D dose distributions in a principal plane containing the central axis for 6-20 MeV electron beams. Relative depth-dose and 2-D dose distributions were measured in the phantom using both Kodak XV radiographic and GafChromic EBT radiochromic films. To evaluate the dosimetric accuracy of the film-phantom system, film measurements were compared to equivalent measurements acquired using a scanning diode and water phantom. Dose differences were evaluated with respect to regional criteria of acceptability: (1) high dose, low dose-gradient region ($\leq 2\%$ dose), (2) high dose-gradient region (≤ 2 mm DTA), and (3) low dose, low dose-gradient region ($\leq 2\%$ dose).

Results: Radiochromic film depth-dose measurements (9 and 16 MeV) agreed with diode measurements within criteria in all regions. Radiographic film depth-dose measurements also agreed well in all regions excluding the build-up region (<10 mm depth) where measurements were approximately 3% low. For both types of film, 2D dose distributions agreed with diode measurements in all regions of the curve with the maximum error ($\approx 3\%$) near the surface (95% dose contour).

Conclusion: The prototype phantom is capable of measuring relative electron dose distributions using radiographic and radiochromic film that are consistent with measurements taken using a scanning diode in a water phantom.

Conflict of Interest: Gammex-RMI, Inc. provided the prototype phantoms for this study.