AbstractID: 9613 Title: Non-divergence of large fields with changing relative depth and effects of wall proximity in 3D water scanning.

Purpose: Photon beams are assumed to be divergent within water phantoms (WP) with increasing source to detector distance (SDD). For symmetric fields, the profile tail should be equal on each side. We investigate differences observed in 3-D WPs with phantom wall proximity and depth.

Method and Materials: Profiles of various field sizes were obtained for in-plane and cross-plane directions with a 3-D water tank. Two methods were used, 1) a fixed source to surface distance with detector depth or 2) varied depth and fixed SDD. With a fixed field size, profiles obtained via method 1 were geometrically scaled to 10 cm depth. The resulting field widths were compared. Field widths obtained with method 2 were also compared. Point measurements were made at ±17cm from the center of symmetric fields to assess dose differences from phantom wall proximity. Due to the water tank design, for y-plane these two points will be either 8 or 22cm from the phantom wall while for the x-plane they are both 7cm. To study the lack of phantom material in one direction, additional water or solid water was placed adjacent to the 3-D water tank.

Results: Using the two methods, radiation field widths were observed to decrease with depth for fields greater than ~25x25cm^2. For the x-plane, measured profiles are symmetric. For the y-plane a relative dose difference of up to 12% was observed outside the penumbra. Adding additional material showed minimum improvement.

Conclusion: The radiation field width for large fields was found to be non-divergent in the WP. Additionally, as the profile approaches the tank wall the relative dose decreases.

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