AbstractID: 8445 Title: End Effect Influence on Segment Precision

Purpose: To study the influence of end effect on segment precision as a guide to minimum MU per segment guidelines for IMRT. **Method and Materials:** Two methods of end effect measurement (linear curve fit and split exposure method) were correlated with measured variation in segment dose ranging from 0.5 to 128 MU per segment. End effect measurements were based on ionization chamber data. Segment dose variations were based on MapCheck results from a segmented field consisting of 4 equal segments, each exposing a quadrant of a 10x10 field. **Results:** There was considerable variation in the value of end effect determined by the split exposure technique depending on the value of the single exposure and the number of fractions into which it was split, i.e. $\alpha=((Rn-R1)/(nR1-Rn))t$ was not consistent as t and n were varied. The segmented exposures tended to show overdose in the first and third quadrant and under dose in the second and fourth quadrant, again with some inconsistency. Variations as high as 40% dose difference in a segment compared to a non-segmented field were noted. Maximum deviations were equivalent to 0.4 MU. **Conclusion:** The results suggest a reaction time equivalent to about 0.4 MU. This represents the time between reaching a desired dose and a circuit response. This is consistent with the variation in both segment precision and end effect measurements. To make 0.4 MU insignificant requires a high number of MU/segment and other considerations such as the percentage of dose delivered by a segment need to be included in developing final MU/segment guidelines.