AbstractID: 1624 Title: Radiation Field Offset Measurement & Verification: Implication For Step-And-Shoot Treatment Delivery

To account for the rounded leaf end of some MLCs, most treatment planning systems (TPS) allow the user to enter a Radiation field offset (RFO) parameter. This parameter enables the TPS to more accurately model dose at boundaries between delivery segments. We have implemented a simple technique to measure and verify the RFO using film dosimetry, and to evaluate its effect on dose distributions. The RFO was measured using a double-exposure technique that utilized a series of fields, with varying offsets, to expose radiographic film. The films were scanned and the overlap that gave the most uniform intensity was entered into the TPS dose model. To verify the measured RFO, a single-field uniform dose plan, consisting of two abutting segments was calculated, delivered and analyzed. To quantify the impact of RFO on step-and-shoot dose delivery, two seven-field IMRT plans were calculated using different dose models, one with the correct RFO and the other doubled. Individual field planar dose images and composite dose distributions were acquired for both plans and compared using a film dosimetry system. Comparison of the two planar dose distributions confirmed that the abutment regions were underdosed when using the larger offset, yet the total dose delivered was insignificantly lower. Analysis of the composite distributions demonstrated that the cumulative dose difference was significantly smaller than commonly observed plan/film differences for hybrid phantom plans. While not as significant as expected, it is important to determine the contribution of the RFO to the total uncertainty of your QA process.