AbstractID: 11301 Title: Characterizing a Multi-Axis Ion Chamber Array

Purpose: To characterize a commercially available multi-axis ion chamber array for use as a scanning water tank alternative.

Method and Materials: The ion chamber array used in this study was the IC Profiler (Sun Nuclear Corporation: Melbourne, FL). We characterized four items of the array: reproducibility, dose linearity, backscatter response, and water tank agreement. Short and long term reproducibility's were established on a ^{60}Co teletherapy unit (Eldorado 6; Atomic Energy of Canada Limited: Mississauga, Canada). The remaining tests were conducted with a Synergy (Elekta: Crawley, UK) linear accelerator (LINAC) operated at a nominal photon energy of 6MV.

Results: Over a short time period the array displayed a maximum standard deviation of 0.55% and a mean standard deviation of 0.15%; over a long time period the array displayed a maximum standard deviation of 1.80% and a mean standard deviation of 0.76%. The array was sensitive to startup characteristics of the LINAC when operating in pulsed mode; this affected the dose linearity relative to a Farmer chamber operating under the same geometry. This effect was not observed when the array was operated in continuous mode. Both the array's central axis detector and a Farmer chamber displayed a similar increase in measured signal with increasing backscatter. However, with increasing backscatter (up to 16.6 cm) the arrays in-beam-profile shape changed by less than 0.7% relative to a setup with no additional backscatter. The agreement between the array and a scanning water tank differed by less than 1% in the beam.

Conclusion: The IC Profiler is a viable option for water tank 'like' measurements. The device provides a stable platform with good dose linearity, minimal backscatter response, and uniform profile measurements.

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