AbstractID: 2887 Title: A comparison of Physical and Virtual Wedges: Measurement of Collimator Scatter with a Miniphantom

Purpose: The purpose of this study was to measure the Collimator Scatter Factor S_c for Physical Wedge (PW) fields and Virtual Wedge (VW) fields with a miniphantom and to compare them.

Methods and Materials: Measurements were performed on a linear accelerator producing 6 MV and 18 MV x-rays. Data were collected from field size 4x4 cm^2 to 25x25 cm^2 and all measurements were done with miniphantom at extended SSDs and the effect of SSD on S_c was evaluated.

Results: It is observed that the S_c values for PW fields are always higher than those of VW fields. However, for smaller field sizes upto 10x10 cm^2, the difference in S_c between PW and VW almost does not exist for all wedges. For field sizes greater than 10x10 cm^2 the difference increases with field size and upto 45° wedge angle. The maximum difference of about 3.5% occurs at 45° wedge angle for larger field size in both energies.

Conclusion: The SSD has negligible effect on S_c for both PW and VW fields. S_c values for PW fields are always higher than that of VW fields are probably due to the general notion that PW in the beam act as additional extended source of scatter radiation. While there is a significant difference in S_c values for 45° wedge for larger field size, there is negligible difference for smaller field sizes upto 10x10 cm^2 for all the wedge angles in both energies. It is most likely due to scattered radiation from the irradiated wedge volume that increases with the field. It is further observed that for PW, the scatter increases with the wedge thickness at the central axis. The S_c values for PW 60° fields are less than those for PW 45° fields due to less wedge thickness at the central axis.