We have established the accuracy of a fast TMR dose algorithm as a function of field size and configuration. The algorithm is applicable to open and wedged static fields. It implicitly accounts for scatter through the use of measured TMR data, a measured off-axis ratio and fitted penumbra functions. This provides very rapid 3-D dose calculation permitting the rapid plan optimization essential for real-time 3-D and/or stereotactic planning. This algorithm works well for small fields but breaks down with increasing field size. Choosing suitable sites to apply the algorithm requires that the point of breakdown be known. We've established this through volumetric dose comparisons between the fast TMR algorithm and a 3-D planning system performing a clarkson scatter integration. Agreement was excellent for fields 7x7 and smaller. For a single 7x7 field, 97.2% of the points in the high dose region (>80% of isocenter dose) agreed to within 5%. For field configurations using more than one field agreement improved to 99%. Spatial agreement between isodose lines was within 1.5 mm. For larger fields the algorithm rapidly breaks down. For a single 10x10 field only 75.1% of the points in the high dose region agreed to within 5%. Absolute output at isocenter agreed exactly for all field sizes. These results indicate this algorithm should be very useful in plan optimization for head & neck as well as intracranial lesions using small fields. This research was partially funded by Radionics Inc., Burlington, MA.