Clinical implementation of 3-D treatment planning with CT-based density corrections necessitates a quantitative comparison between the predictions of the dose delivered by 3-D systems and conventional 2-D treatment planning systems. This includes assessing the clinical significance of any deviations found between the systems and determining what modifications, if any, may be needed to prescription doses for isodose plans generated by the more sophisticated 3-D systems. In this investigation, dose calculations were carried out with 2-D conventional systems (Theraplan V05 and GE Target Vn 4.0) and with a convolution based 3-D system (ADAC Pinnacle3 ), both with and without inhomogeneity corrections. Test cases included a 4-field setup for treatment of the prostate and a 6-field setup for treatment of the esophagus for 6 and 18 MV photons. Comparison of the homogeneous to the heterogeneous 4-field setup showed expected variations in isocentric doses of 1% to 3% for 18 MV and 6 MV photons due to the presence of bone. For the esophagus setup with inhomogeneity corrections in both cases, the doses computed by the 3-D system for various points in the tumor ranged from 2% to 6% lower than those computed by Theraplan for the same points. These findings confirm that careful consideration must be given to implementing 3-D density based calculations in the clinic. This includes determining the magnitude of any deviations in dose calculations from conventional treatment planning systems, particularly for sites where there are large density variations in proximity to the tumor.