Purpose: To compare the differences in measured data using Tomotherapy's TomoScanner™ 2D Water Phantom versus IBA's Blue Phantom Helix taken during commissioning of the Tomotherapy HD unit.

Methods: IBA Helix was used with CC04 ion chamber to measure Inline (jaw-size width), Crossline (40 cm width) and Percent Depth Dose (PDD). Data was analyzed using IBA Omni-Pro 7.3 software. Measurements were performed at 85 SSD for field sizes 5x40 cm, 2.5x40 cm, and 1.0x40 cm. All field sizes were measured at 1.5 cm (nominal d<sub>max</sub>), 5 cm, 10 cm and 15 cm depths. Scans were performed at a continuous speed setting of 0.5 cm/sec. Setup and data measurements were performed twice on separate occasions for consistency and repeatability. Data measurements were normalized to 10 cm depth and compared to commissioning data taken from TomoScanner™ and Tomotherapy's Twinning Data.

Results: For all jaws, the profiles measured at 5 cm, 10 cm, and 15 cm depth using IBA Helix matched the profiles of the TomoScanner™ data within 1%. Profile variance at 1.5 cm depth showed a deviation of up to 3%. For all jaws, the PDD comparisons displayed 3-5% deviation from the surface to 2 cm depth and within 1% deviation at 2 cm to 15 cm depth. Measurements performed using CC04 ion chamber versus A1SL ion chamber (used by Standard Imaging) showed data differences of less than 0.5%.

Conclusions: Discrepancies in Tomotherapy beam profiles were observed between different water phantoms. Further investigation is required to determine the cause of variances between IBA and Tomotherapy data sets such as investigating geometrical differences between the water tanks and software dissimilarities in collecting and correcting raw data. It is recommended that independent commissioning data be taken when TomoScanner™ is not the clinical site's standard water phantom.