AbstractID: 14003 Title: Verification of the Accuracy of the Proton Range Compensator Scatter Factor and Dose within Inhomogeneity Calculations using the Eclipse Treatment Planning System

Purpose: To determine the accuracy of the proton range compensator scatter factor (CSF) and dose near inhomogeneity calculations in the Eclipse Treatment Planning System version 8.1 (TPS). **Method and Materials:** A head phantom was constructed that contains bone-equivalent structures as well as several channels designed for ion chamber placement. A plan was created in Eclipse using the CT scan of the phantom that calculated dose at several selected reference points. Ion chamber measurements were made with a .125 cc cylindrical Farmer chamber at the same locations in the Eclipse plan. Measurements and calculations in water-equivalent phantoms were made with and without compensator for clinical patient plans to determine CSF. **Results:** The measured doses at the selected points in a low dose gradient region were found to be within 1 to 6% of those from TPS. Dose comparisons between measured and Eclipse estimated dose for points lying closer than 1cm from the bone-equivalent material/water interface, gave dose estimates that were 11% to 14% lower than measured values. The distance to agreement were within the range uncertainties associated with CT number stopping power calibration. In addition, in a homogeneous phantom we calculated the compensator scatter factors (CSF) by taking the ratio of the verification plan dose with the compensator in place compared to the verification plan dose without the compensator at the same water equivalent depth for 4 clinical patients. We calculated CSF values for these patients between 0.965 and 1.062; compensator and patient scatter factors (CPSF) values from 0.983 to 1.068 and patient scatter factors (PSF) ranging from 0.97 to 1.019. **Conclusions:** Our measurements indicate that Eclipse reasonably estimates dose within 6% of measurements at regions near the CAX approximately 1cm or further from sharp inhomogeneities.