

AbstractID: 8024 Title: Neutron dose measurement in intensity modulated radiotherapy of 18 MV photon beams

We have measured neutron dose due to high energy x-ray (18 MV) using a Varian® Clinac 2100C linear accelerator and a Eberline NRD neutron detector which consists of a 9" (22.9 cm) diameter cadmium-covered polyethylene sphere with a BF₃ tube. Measurements are made in the integrated dose mode of an Eberline ASP-1 analog meter. We set up a solid water phantom of 30 x 30 x 20 cm³ with an SAD of 100 cm. The detector sphere is placed 1 m away from the isocenter and normal to the gantry rotation plane. We run an 18 MV 10-field IMRT plan of a pelvis using the Corvus® planning system. For comparison, we also run a conventional plan using the 4-field box technique. The results show the neutron dose of the IMRT plan (355.4 mrem) to be almost 9 times larger than the conventional one (40 mrem). Additionally, we choose to see how different field sizes will change our neutron dose measurement. We find that there is no difference in the neutron dose for different field sizes. Therefore, we conclude that neutron dose per monitor unit due to 18 MV x-rays is independent of multi-leaf collimator and jaw settings. Also, an IMRT plan of 18MV (or >10 MV) photon beams can generate much more neutron dose than a conventional treatment plan, since the IMRT plan requires more monitor units. Similar measurements are performed on a Siemens® Primus linear accelerator.