

Intercomparison on the shield design calculation by using Monte Carlo and multigroup discrete ordinate radiation transport

E.Z. Buthelezi^a, F.M. Lukhele^{b,c}, G.F. Steyn^a and J. van Rooyen^a

^a iThemba Laboratory for Accelerator-Based Sciences, Somerset West, 7129, South Africa.

^b University of Zululand, Private BAg X1001, Kwa-Dlangezwa, 3886, South Africa.

^c University of the Western Cape, Private Bag x17, Bellville, 7353, South Africa.

The local radiation shielding of the three target bombardment station at iThemba LABS were designed using the multigroup discrete ordinate calculations. Only isotropic source terms could modelled with this code and this is only good for rough estimates. With the Monte Carlo code, MCNPX, both source terms, viz., isotropic and anisotropic, were modelled. These simulations were performed to re-evaluate the configuration of the existing target radiation shields so that they could be used as benchmark for the design of the radiation shield for the newly installed Vertical-Beam Target Station (VBTS). The VBTS is situated in the vault which is open on the top and is not completely closed at the bottom. There is also irradiating ground water in the pit below the floor level. A novel feature of the station is the split design of the shield in order to improve the accessibility to the in-beam components and to reduce dose to maintenance staff.