

AbstractID: 9052 Title: Application of miniature TL dosimeters in a fast neutron therapy beam

The objective of this study was to adopt the miniature  $\text{CaF}_2:\text{Tm}$  (TLD-300) cubes (1 mm x 1 mm x 1 mm) for dosimetry of  $d(48)+\text{Be}$  fast neutron therapy beam. A cohort of 122 TLD's was subdivided in three groups based on the response to uniform dose of 1Gy in  $^{60}\text{Co}$  beam. The total response distribution of each group was within 4% to 8% one standard deviation relative to the mean. The ratio of areas under low and high temperature peaks of the glow curves demonstrated remarkably reduced standard deviation of about 1.2% for each group. These grouping characteristics were consistent during 4 consecutive irradiations. Sets of 12 TLDs were encapsulated in A-150 tissue equivalent plastic and irradiated in the neutron beam at various locations in a water phantom. The neutron and gamma doses were previously measured at these locations by the paired detector method with a TE ion chamber and a miniature G-M counter and varied from 0.042 to 0.166. The peak ratios as a function of gamma dose component were fitted to a linear regression. This relationship was used to determine total dose and separate high and low LET components in an open  $10 \times 10\text{cm}^2$  field and under conditions of fully closed collimation. The total dose transmission through the closed collimator was measured as 3.3% and contained about 17% of gammas, which is in a good agreement with the results obtained by the paired detector method.