

Comparison of dose standards for linac photon beams at NRC Canada and LPRI France

The NRC Canada has declared a new absorbed-dose-to-water standard for ^{60}Co based on its sealed water calorimeter. This device was also used with higher energy photon beams for measurements of k_Q and the energy dependence of G . Three NE 2571 graphite ionisation chambers calibrated at NRC were taken to the Laboratoire Primaire des Rayonnements Ionisants (LPRI), France for a comparison with their dose standard. The LPRI standard was based on measurements of dose to water at ^{60}Co using a graphite calorimeter. For higher energy beams at LPRI, the dose was determined by averaging ionisation chamber and Fricke dosimetry measurements. The change in ionisation chamber sensitivity as a function of beam quality was estimated using the new IAEA dosimetry code of practice, which is similar in principle to TG-51. For Fricke, the energy dependence of G was based on measurements done previously at NRC. If the comparison uses $\%dd_x(10)$ to specify beam quality, the LPRI dose is not significantly different than NRC's value at both 12 MV and 20 MV and certainly well within estimated uncertainties. However, these differences would be exacerbated if the comparison were done using TPR20/10. The discrepancy between the NRC measured values and TG-51 calculated values of k_Q for the NE 2571 increases with increasing energy, reaching about 0.6% at 30 MV.