

RPC WEBPAGE NEWSLETTER

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Changes to the RPC's TLD program

For many years, the RPC has conducted an independent audit of the output of megavoltage beams using mailed TLD. For photons, the TLD system measures output at d_{\max} while for electrons both output and depth dose are measured. The justification for measuring depth dose stemmed from an observation early in the program that there were frequent differences of greater than 5 mm between an institution's measurement of depth dose in electron beams and the RPC's determination.

This is no longer the case. An analysis of the RPC's TLD data from the last 4-1/2 years indicated that only 113 depth dose errors were detected. After repeat TLD were performed, only 14 of these errors were confirmed. This is an error rate of less than 0.1%.

The RPC has considered several options, ranging from tightening the agreement criteria (presently 5 mm) to discontinuing measurements of depth dose altogether.

Tightening the criteria has been rejected for the following reason: The uncertainty of the RPC's depth dose measurement is estimated to be approximately 2 mm at the 2-sigma (95% confidence) level. In addition, the TG-40 report advises physicists to assure that electron beam percent depth dose is constant to 2 mm. This indicates that it would be unrealistic for the RPC to tighten the criteria to less than 4 mm. We felt that changing the criteria from 5 mm to 4 mm would present an increased burden with little additional benefit. An analysis of our data showed that even at the 4 mm level, only 21 depth dose errors (0.13%) would have been detected and confirmed.

Discontinuing measurements of depth dose entirely was similarly rejected, as too drastic a step.

Instead, the RPC has instituted a new policy, effective with the October mailings of TLD, of discontinuing routine measurements of percent depth dose. However, depth dose capsules will be included whenever repeat TLD are sent to an institution to confirm an apparent discrepancy in electron beam output. In addition, depth dose measurements will be made at the first audit of an electron beam; whether the institution has newly joined our program, or a new machine has been installed at an active institution. On this occasion, all electron beams will be measured to establish a baseline for both output and depth dose.

The RPC will continue to use the acrylic blocks you're accustomed to, but will not put TLD capsules into the lower set of holes, for routine measurements. We have confirmed that leaving these holes empty does not affect the measurements at d_{\max} .

As always, we are happy to receive questions about changes to our procedures at 713-745-8989 or rpc@mdanderson.org. Additional details about the statistics of our TLD program were described in an article by [Kirby](#). Previous issues of this Newsletter and answers to many questions can be found at our [FAQ](#) page.