AbstractID: 11332 Title: Optically Stimulated Light Dosimetry: Commissioning of an optically stimulated luminescence (OSL) system for remote dosimetry audits, the Radiological Physics Center Experience

For the last 30 years the Radiological Physics Center (RPC) has used TLD dosimetry to conduct remote audits of beam output of photon and electron beams and energy checks for electron beams. Acrylic blocks containing capsules of TLD powder were sent for each beam. Powder was used as a single-use disposable dosimeter. The RPC has previously described the use of the remote audits to identify units with beam measurements exceeding 5% and 5 mm. The system uncertainty is 1.5% (1 standard deviation) indicating high confidence in the 5% threshold for acceptability.

OSL dosimeters have been available since 1992. Several publications have described their use for dose measurements at therapeutic levels. After a promising initial evaluation, the RPC decided to purchase and commission OSL dosimeters and instrumentation with the goal of implementing an OSL-based system into the remote audit program.

As part of the commissioning procedure, the depletion characteristics of OSL dosimeters were studied as they relate to the number of readings, the reader and the changes after annealing. Dark current and standard signal characteristics of the reader were evaluated and compared against factory specifications. The mechanical properties of the reader positioning characteristics were also tested.

Because OSL dosimeters have unique sensitivities, response factor was determined and analyzed in terms of its variability with each reader, annealing cycle and cumulative dose. Dose dependence was also tested against annealing and accumulated dose. Energy dependence factors and fading characteristics were determined.

A group of dosimeters from a single production was purchased and commissioned for use. Dose response, energy and fading characteristics for the batch were defined together with the design of a reading session and a quality assurance program.

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