AbstractID: 5257 Title: Feasibility Study into Glass Rod Detectors as a “Postal Dosimeter”

Purpose: To investigate the potential of glass rod detectors (GRDs) for a “dosimetry by mail” service and possible use by the Advanced Technology QA Consortium (ATC) for credentialing of institutions in multi-institutional clinical trials. Since thermoluminescent detectors (TLDs) are established for a number of mail-in calibration checks, specific niche areas were sought for GRDs.

Method and Materials: Two areas of investigation that proved fruitful were Gamma Knife (Elekta AB, Sweden) for helmet output factors and absolute calibration and when confirming the calibration of a cell irradiator (Rad Source Technologies Inc, Fl. USA). One difficultly with the cell irradiator is that the door remains closed during beam on so that ion chamber, diode and MOSFET detector calibrations are problematic. GRDs were found to be particularly useful as they demonstrate insignificant energy dependence, no directional dependence and no significant dose rate dependence.

Results: In collaboration with City University London, UK, specifics of alteration in GRD response to transatlantic shipment were studied. In particular energy response was studied using a variety of low energy X-ray spectra available at the National Physical Laboratory (NPL), Surrey, UK. A simple batch calibration process and assigning a small quantity of GRDs as controls were the only measures necessary when comparing mailed GRDs to those held in-house. This current work has demonstrated that the same level of accuracy as previously found by experienced users is possible by an “untrained” user, but it was noteworthy how explicit, simple and unambiguous instructions needed to be.

Conclusion: GRDs represent a high accuracy dosimeter for a photon dosimetry “by mail” service that would cover energies from 20keV to 25MV and absolute dose values ranging from milli-gray to approximately 100 gray. GSD’s appear to be well suited for use in anthromorphic phantoms for credentialing institutions for participation in multi-institutional clinical trials.