

AbstractID: 5866 Title: Feasibility of Calibrating Elongated Brachytherapy Sources using a Well Type ionization Chamber

Purpose: TG-43 recommended parameters of a brachytherapy source require calibration of the source using the WAFAC system by the NIST. However, the presently available NIST standard system is limited for calibration of sources with active lengths ≤ 1 cm. A new procedure has been introduced for calibration of elongated brachytherapy sources (i.e. active lengths > 1 cm) as an interim solution to the calibration standards by the NIST. This procedure is based on commercially available well type ionization chambers.

Materials and Methods: The variation of the source calibrator response as a function of the source position along the longitudinal axis of the chamber was measured to determine the relative correction factor (RCF). Then the NIST calibrated source was used to calibrate the response of the source calibrator. A train of the 1 cm source segments were used to create elongated sources with different active-lengths ranging from 1 cm to 7 cm. The measured air kerma strength were compared with the total source strengths calculated as the sum of the individual 1 cm source segments utilized to compose the source.

Results: The results of these investigation have indicated that the response of the Capintec CRC was nearly constant (within 0.5 %) for distances ranging from 4.9 cm to 14.9 cm from the bottom of the chamber. With this information and a calibration factor of 4.881 Reading/U, air kerma strengths of RadioCoil™ Pd-103 sources with active length of 1 to 7 cm were measured. The results of these measurements were found to be within $\pm 0.4\%$ of the values calculated by addition of the 1cm source segments used in creating the sources.

Conclusion: A well type chamber with the calibration for the 1 cm long RadioCoil™ ^{103}Pd source segment can be utilized for calibrating of an elongated source with different active lengths sources.