

AbstractID: 6948 Title: Quality Control and Assurance for Prostate Brachytherapy Seed Calibration at The National Institute of standards and Technology

Quality control and assurance are important components of the prostate cancer brachytherapy seed calibration program at the National Institute of Standards and Technology (NIST). Seeds are calibrated in terms of air-kerma strength using two wide-angle free-air chamber (WAFAC) standards; one automated, the other manual. In addition to calibration checks on temperature, pressure and voltage measuring devices, NIST uses several procedures and devices for quality assurance and control of its seed calibration service. All calibrated seeds are measured in three different well-ionization chambers. For any given seed design, the control factor is a consistent ratio between the well chamber response and the WAFAC air-kerma strength. The photon spectrum emitted from one seed of each batch submitted for calibration is measured by x-ray spectrometry using a high-purity germanium (HPGe) detector. Periodically, measurements are made with both WAFAC standards using an Am-241 source. In this case, the two control factors are agreement between the WAFACs and a consistent response over time. One seed from each batch sent in for calibration is measured using both WAFACs. A quality control procedure that pertains only to the automated WAFAC is the use of linear encoders on its axes to record the exact change in volume and position of the chamber's mid-plane. This technique assures an accurate measure of the volume change, a direct factor in the seed calibration. Another quality control procedure involving a linear encoder involves tracking the position of the aluminum absorber used to filter the Ti x-rays from the seed encapsulation.