AbstractID: 8922 Title: Effect of Phantom Material in Evaluation of AEC for DR Systems

The AEC performance for DR units is more critical than for film-screen because DR images give poor feedback on over- or under-exposure. AEC performance is evaluated by medical physicists and calibrated by field engineers using a wide variety of phantom materials, including buckets of water, aluminum slabs, Lucite, polystyrene, and tissue equivalent plastics. Generally this evaluation involves AEC exposures over a range of phantom thickness and over a range of x-ray kVp settings; the desired endpoint being either constant entrance exposure (uR) to the image receptor, or constant average signal from the digital image receptor (DR#). Often medical physicists also measure entrance skin exposure (ESE) data during this procedure for reporting typical patient exposures, or for organ dose calculations like fetal dose estimates.

The purpose of this study was to evaluate the effect of the type of phantom material used on the AEC performance of two DR systems, one employing an α-Se detector, the other a CsI detector. It was found that water, lucite, and solid water gave similar ESE for the same thickness, but polystyrene gave a considerably lower ESE for the same thickness. Within any one phantom material, it was found that the DR# was quite independent of phantom thickness. However, the DR# was a function of the phantom material used. The conclusions to be drawn are; 1) do not use polystyrene to estimate patient ESE, and 2) do not mix different phantom materials in the calibration and evaluation of AEC performance of DR units.