

## AbstractID: 6657 Title: Cerenkov Light from Phantom Cassettes in Absolute Dose Measurements using Radiographic Film

**Purpose:** To determine the impact of Cerenkov light on radiographic film response and to recommend a methodology for correcting absolute dose measurements when using bare film, but calibrated using prepackaged film.

**Method and Materials:** The Gammex RMI Film Dosimetry Cassette Model 436-AST (Solid Water) and two in-house cassettes (white opaque, high-impact polystyrene) were studied using Kodak XV or EDR2 film. Films were exposed perpendicular to 16-MeV electron ( $15 \times 15 \text{ cm}^2$ ) or 6 MV x-ray ( $20 \times 20 \text{ cm}^2$ ) beams. Films were oriented such that quadrant #1 had bare film; quadrant #2 had film covered by the prepackaged white paper; quadrant #3 had film in its prepackaged container; and quadrant #4 had film covered by the prepackaged carbon jacket. To account for beam asymmetry, dose response for each quadrant was normalized to that in the corresponding quadrant of a film irradiated in the carbon jacket, which blocked phantom-produced Cerenkov light. A prepackaged film, irradiated using a multi-exposure technique, provided the dose-response calibration.

**Results:** The "carbon jacket only" dose values averaged 96.1% of the "prepackaged" dose values, indicating that the prepackaged white paper produced Cerenkov light that increased film response by 4.0%. No significant difference due to radiation modality or film type was evident. The "white paper only" dose values ranged from 103.6-107.5% of the "prepackaged" dose values, indicating that Cerenkov light from the phantom material contributed to an increased film response. For white opaque, high-impact polystyrene the "bare film" dose values ranged from 102.2-109.6% of the "prepackaged" dose values, depending on phantom and modality. For Solid Water the "bare film" dose value was 117.3% of the "prepackaged" dose values.

**Conclusion:** When making absolute dose measurements using bare film and calibrating using prepackaged film, a correction for excess film response arising from Cerenkov light is required, and the reported quadrant method is recommended.