Purpose: Concern over increasing utilization of X-ray together with several publicized accidents involving medical radiation has led to government action. California Senate Bill 1237 is the first legislation of its kind to mandate event reporting whenever CT patient doses exceed specified thresholds for Effective, Organ, Skin, and Fetal dose. However, CT scanners only report CTDI and DLP values. Therefore the challenge for the Physicist - and the focus of this work - is developing a pragmatic means of converting any pre-determined action limit for patient dose into the phantom based dose metrics actually reported by a CT scanner.

Methods: Appropriate to the dose limit of interest, different methods were used for translating patient dose reporting thresholds into scanner reported “trigger” values for CTDIvol or DLP for both axial and helical scans as follows: For Effective Dose, DLP values were calculated using patient age and body part specific k-factors from AAPM report 96. Organ, Fetal, and Peak Skin Dose trigger thresholds are better estimated using CTDIvol, values for which were determined from Monte Carlo simulations considering patient size.

Results: For an Effective Dose action limit of 50mSv, calculated DLP values ranged from 440 mGy*cm for a 0 year abdomen/pelvis to 23800 mGy*cm for an adult head. Cumulative CTDIvol values that would result in an Organ or Skin threshold dose of 500mSv ranged from 200mGy for pediatric scans without table motion to 650mGy for adult scans with table motion. Fetal dose of 50mSv could be exceeded with cumulative CTDIvol of 25mGy and 65mGy without and with table movement respectively.

Conclusions: Determining CTDIvol and DLP that result in a given patient dose requires methods specific to the dose question asked and knowledge of scan type and body region. The methods demonstrated can be generalized to any pre-determined patient dose threshold.