Previous work has shown that significant reductions in effective dose and skin entrance dose can be achieved in diagnostic radiology by increasing the total Al equivalent filtration of the x-ray tube from 2.5 mm, the NCRP recommended minimum, to 4.0 mm.[1] In this paper the impact of additional filtration on tube loading and image quality is assessed. For nine common radiographic projections, average increases in tube loading (mAs) were 99% for a constant free-air entrance exposure, 16% for a constant patient exit dose, and 4% for a constant film density, as the total filtration was increased from 1.5 to 4.0 mm Al at fixed kVp's. From 2.5 to 4.0 mm, average increases were 51%, 18%, and 15%, respectively. With regard to image quality, comparison of radiographs taken with 2.5 and 4.0 mm tube filtration of a contrast phantom (shallow holes in aluminum plates) showed no statistically significant differences in mean target-minus-background film densities or image contrast. This was at the 1 SD level of $\pm$ 0.003 OD and $\pm$ 0.35%, respectively, over the range of 60 to 102 kVp. For 25% incremental increases mA, for tube currents below 800 mA, focal spot blooming reduced spatial resolution by less than 5%.

[1] R. H. Behrman and G. Yasuda, "Effective dose in diagnostic radiology as a function of x-ray beam filtration for a constant exit dose and a constant film density," Med. Phys. (in press).