



Radiographic Density of Selected Materials at Different Thicknesses

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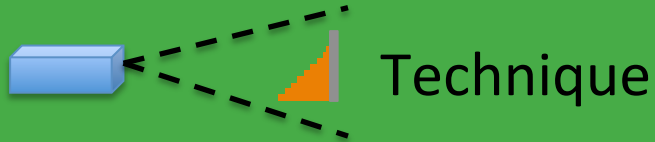
Mentor: Bernice Mills, Sandia National Labs, Livermore



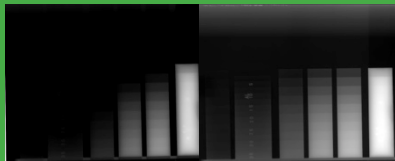
STAR Closing Conference, NASA AMES
August 15, 2015



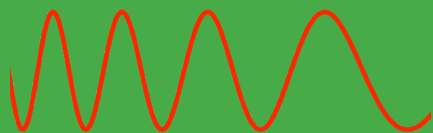
Four major sections will be discussed.



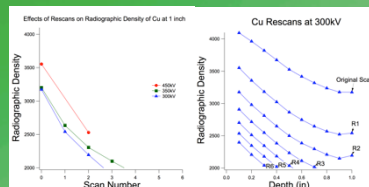
Technique



Effects of Rescanning Residual Images



Effects of Changing Energy (kV) Levels



Conclusions and Moving Forward



The material density affects the amount of x-rays passing through to the film.

Medical

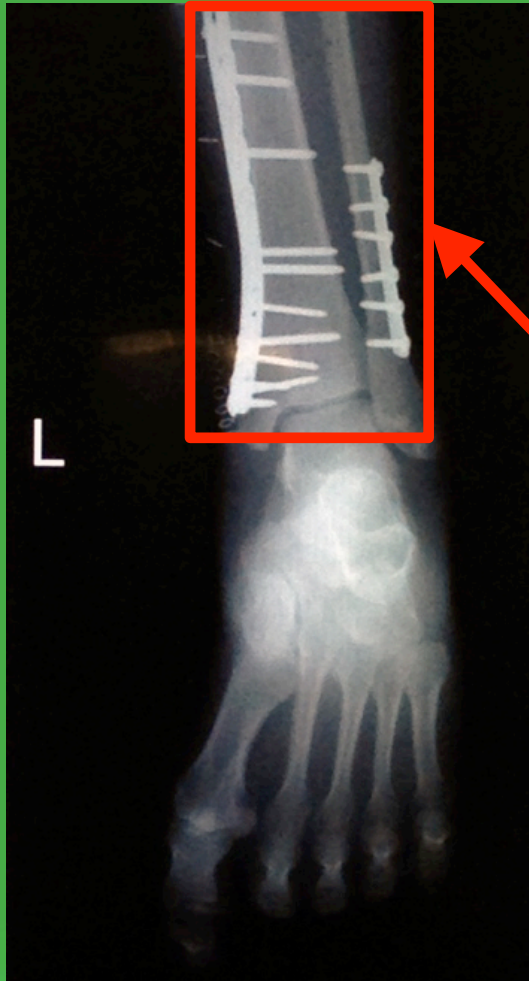


Photo courtesy of James Gonzales
You rock!

Materials with higher Z, atomic mass, is lighter

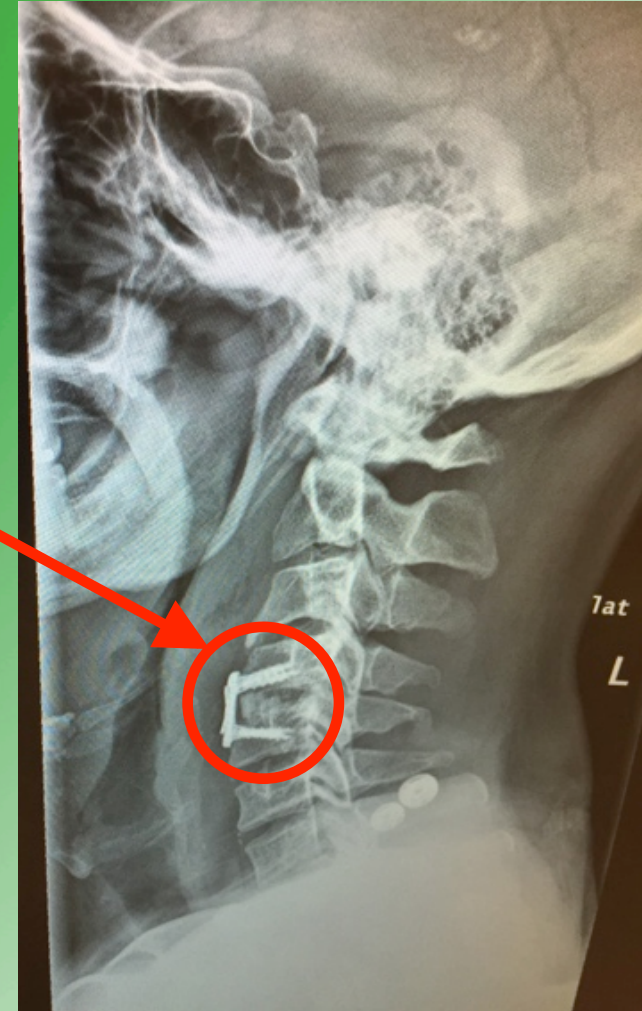


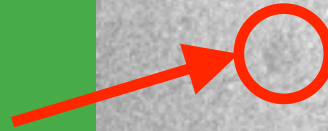
Photo courtesy of Mr. U
You rock!



The appropriate x-ray conditions need to be set in order to clearly analyze the material.

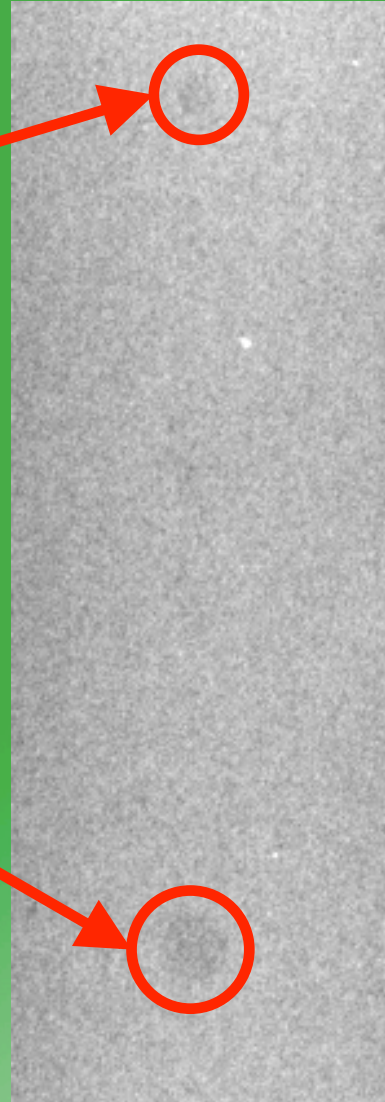
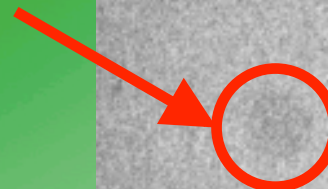
Materials Science

Diameter is 2% of the penetrometer thickness



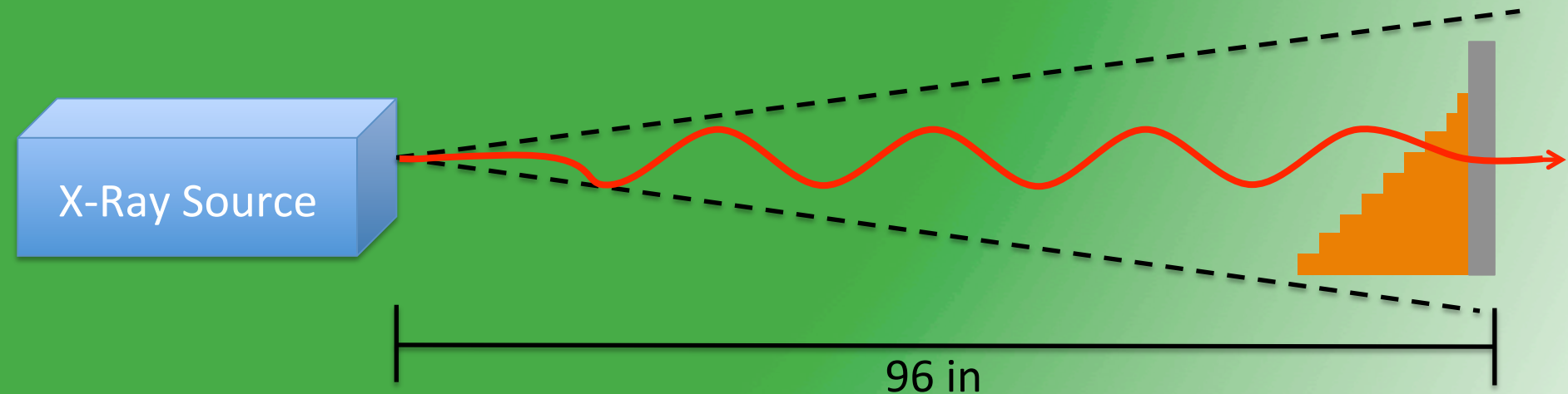
A 0.62 inch stainless steel block with a plate that is 2% of the thickness of the block on top.

Diameter is 4% of penetrometer thickness





The x-ray conditions for the experiments focus on three different energy levels.



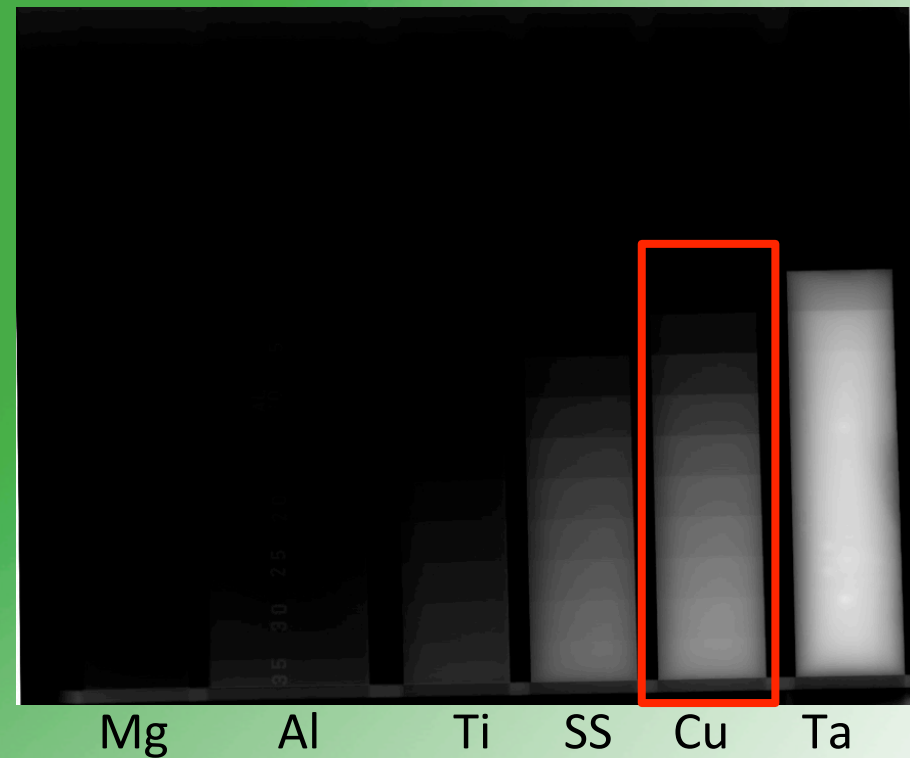
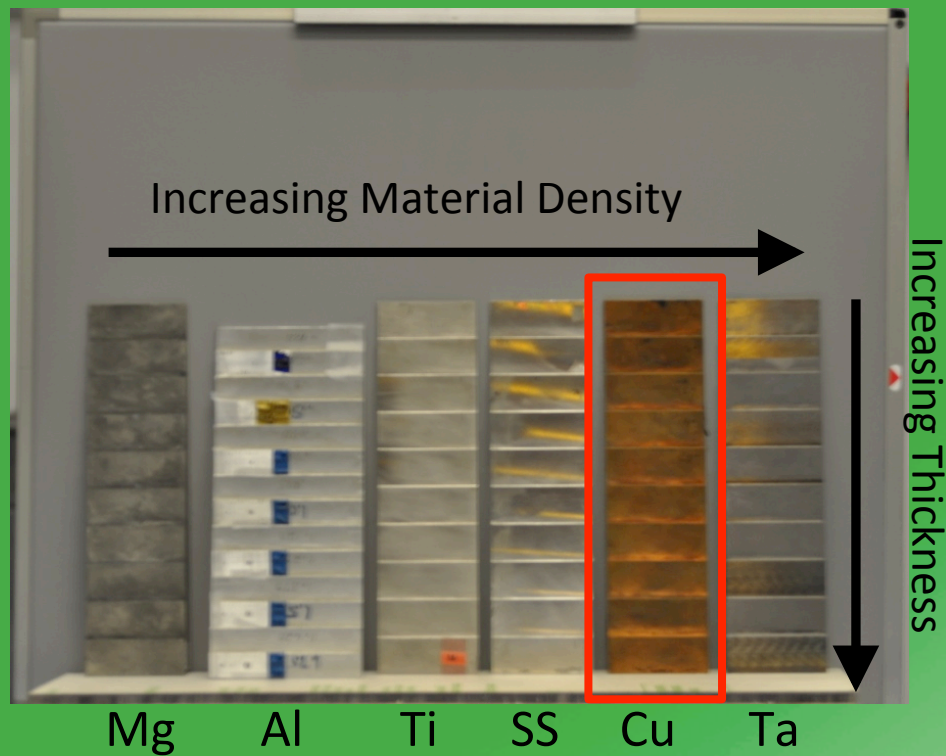
Voltages: 300, 350, 450 kV

Exposure Time: 10 min

Current: 5 mA



The experiment contained six chosen materials based on the material density.





The more rescans taken, the radiographic density decreases.



Original

R1

R2

R3

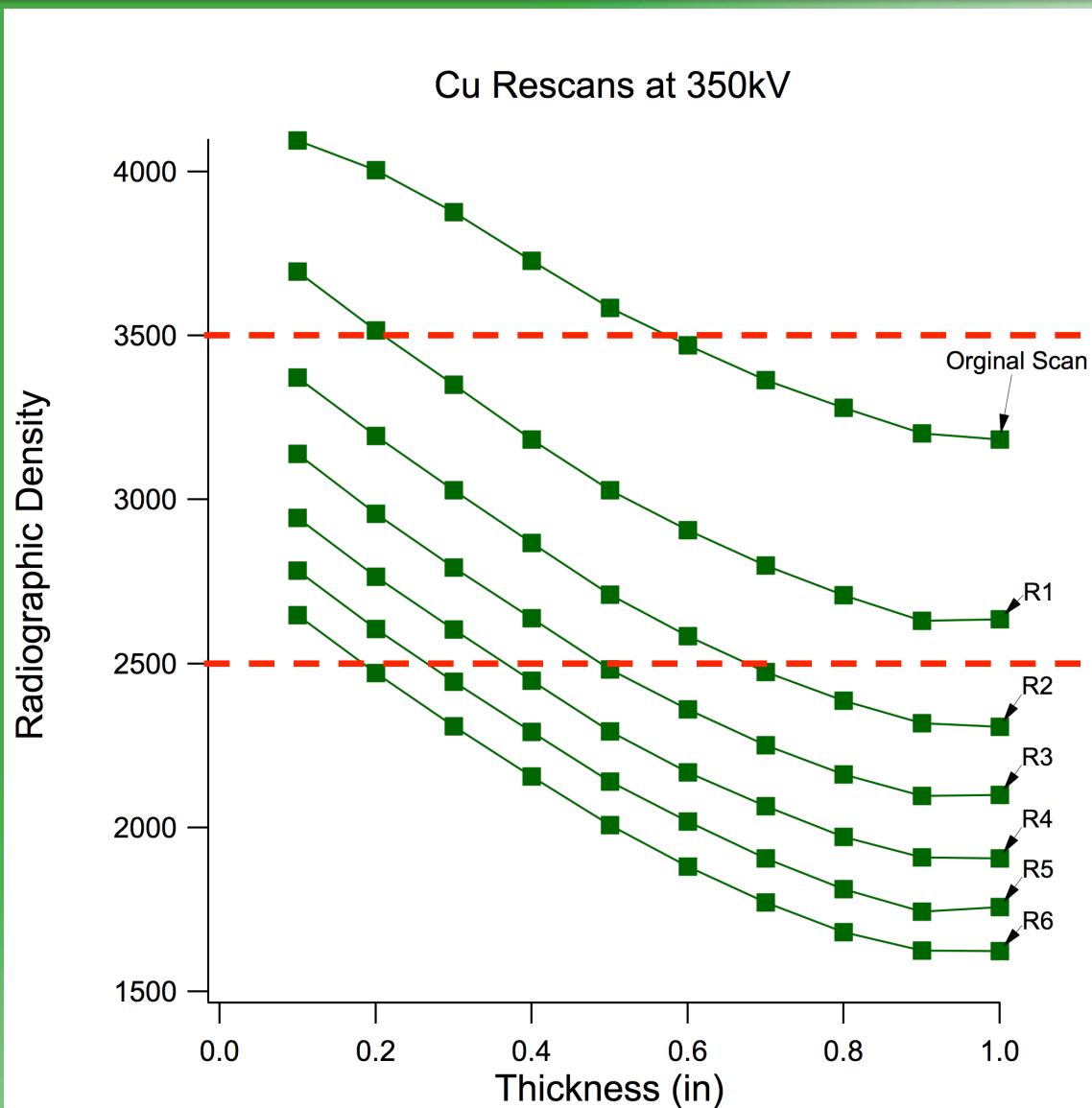
R4

R5

R6

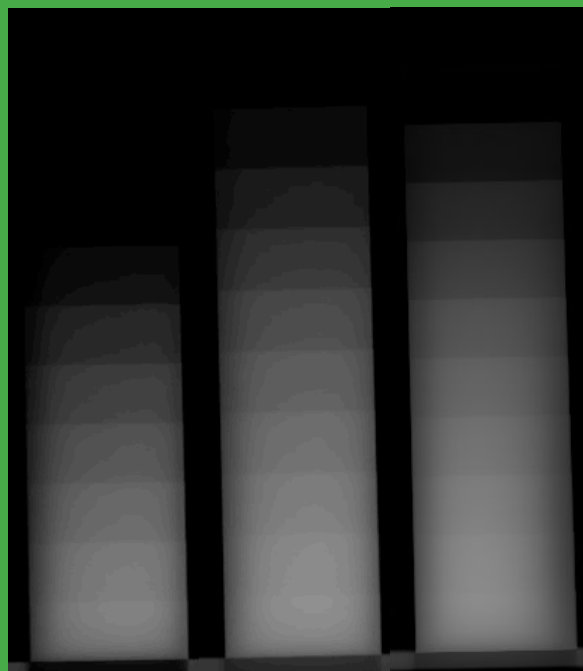
350 kV

The relative amount of radiographic density decreased is lowered between subsequent rescans.

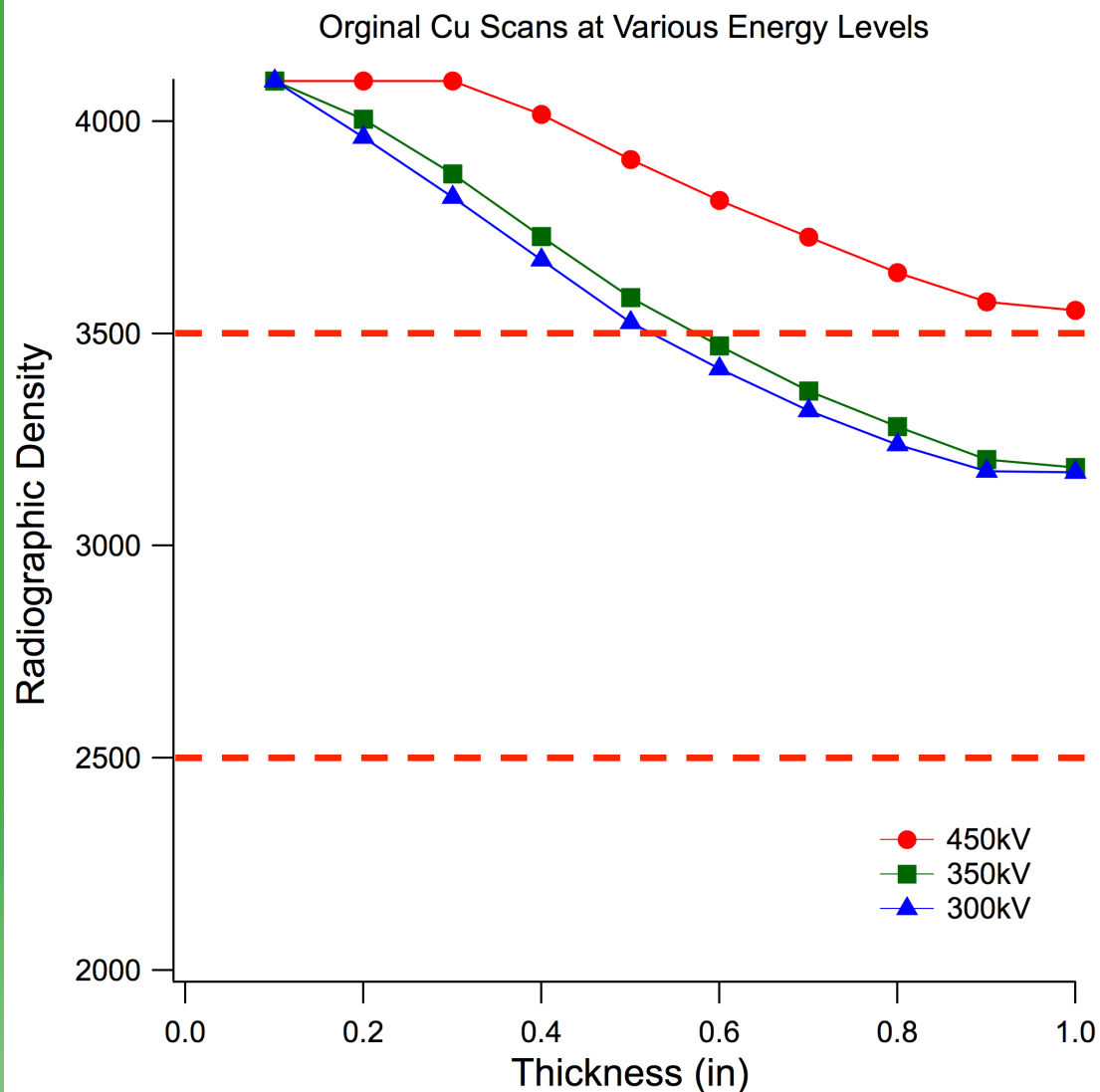


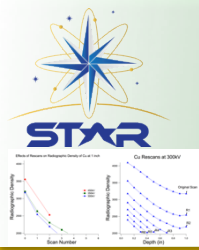


As the energy level was decreased, the radiographic density was lowered.

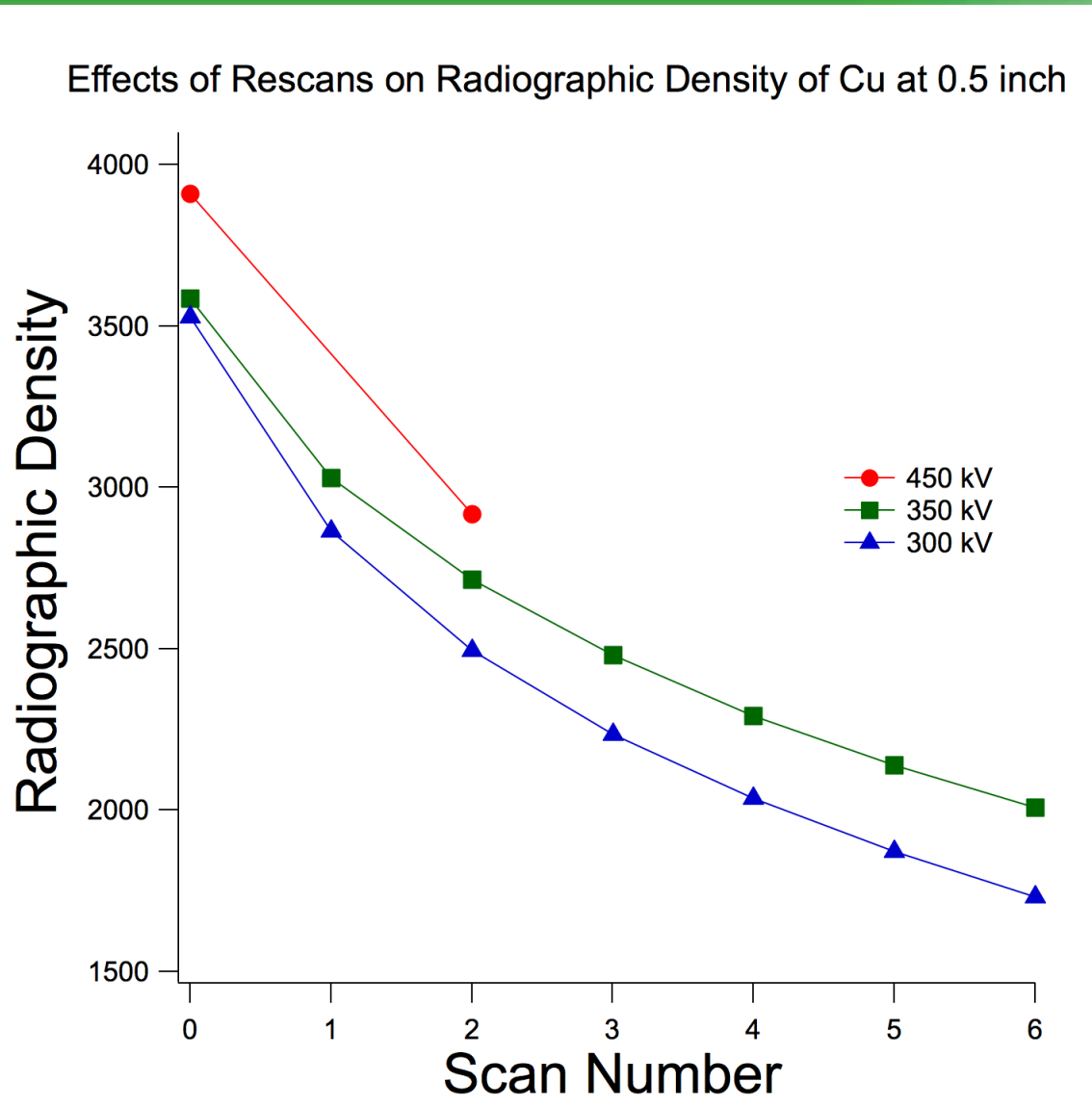


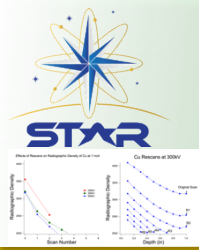
450 kV 350 kV 300kV





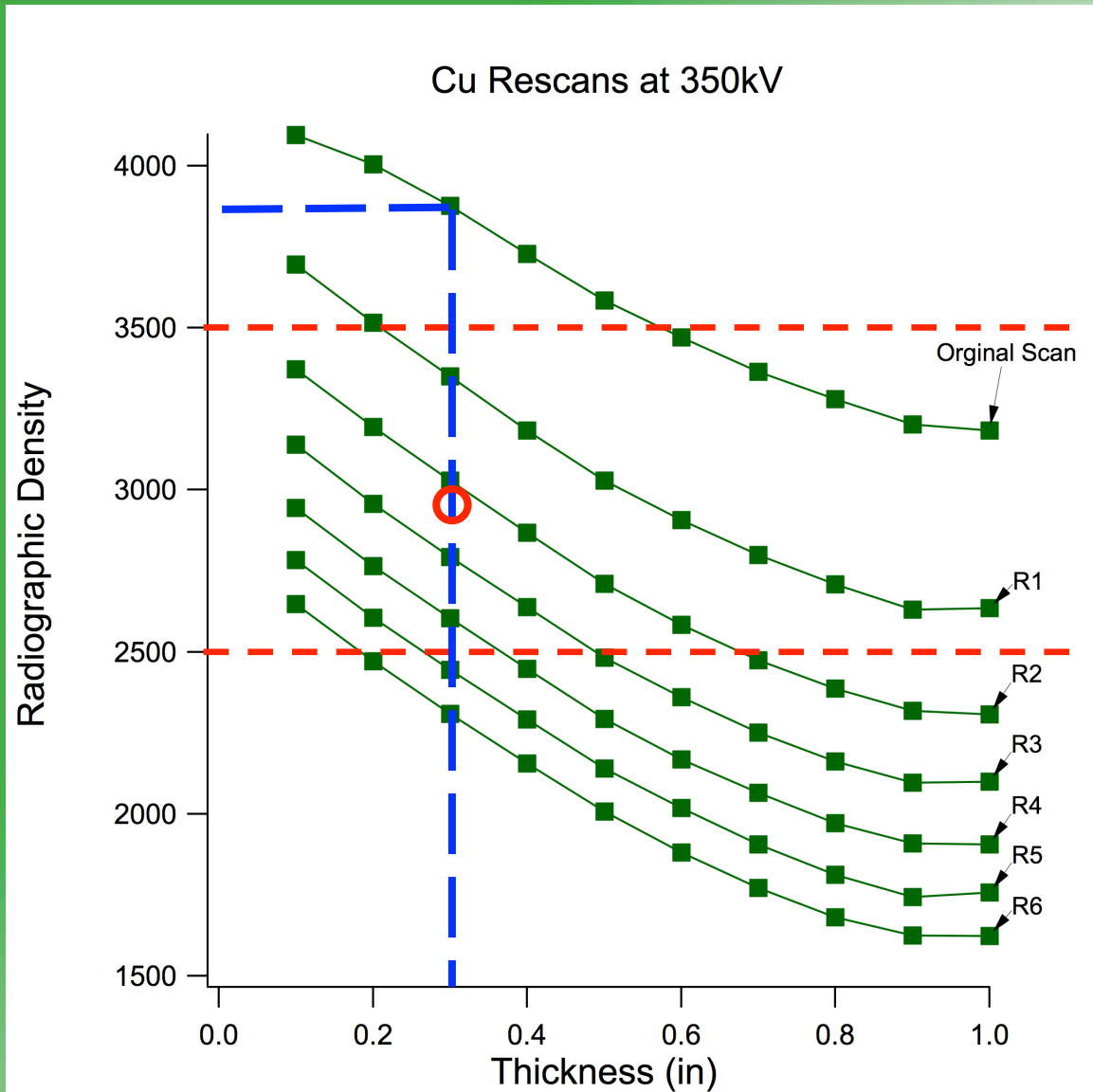
The general trend when taking rescans and decreasing the voltage is a decrease in radiographic density.





An informed choice can be made about the energy level of the x-ray based on the material.

○ → Ideal voltage for a 0.3 inch thick copper sample





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This project has been made possible with support from Chevron. www.chevron.com



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SAND 2015-6851 C