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Observations of Opacity from K-shell Z-pinch Plasmas at the Z Accelerator¹ C.A. COVERDALE, D. AMPLEFORD, B. JONES, S. HANSEN, M.E. CUNEO, Sandia National Labs, J.P. APRUZESE, A. DASGUPTA, J. GIULIANI, Naval Research Lab — K-shell x-ray sources have been studied extensively at the Z Accelerator both pre- and post-facility refurbishment. Radiation and spectra from sources such as Al (5% Mg), stainless steel, and Cu (4% Ni) have been analyzed to understand the dominant mechanisms for the K-shell emission. Recent work (J.P. Apruzese et al., ICOPS 2012) has shown that for some experiments, the K-shell emission is dominated by initial mass and plasma density, and in other cases the emission is driven by electron temperature. In this work, the K-shell emission from the primary materials (Al, Fe, Cu) and the dopant materials (Mg, Cr, Ni) are compared to evaluate opacity effects for these z-pinch plasmas. Experimental data from pre-refurbished Z illustrating that opacity limits the Al K-shell output, but does not significantly limit the Cu K-shell output will be presented, along with observations from the same sources on post-refurbished Z. Comparisons will also be made with the dominant plasma emission properties (mass, temperature, density) to understand the correlation with opacity.

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