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Investigations of stagnated plasma conditions and opacity for K-shell x-ray sources at the Z Accelerator C.A. COVERDALE, Sandia National Labs, C. DEENEY, NNSA-DOE HQ, J.P. APRUZESE, Naval Research Lab, B. JONES, Sandia National Labs, P.D. LEPELL, Ktech — In recent years, experiments have been performed at the Z accelerator to study K-shell x-ray sources, including Al (1.7 keV), Ar (3.1 keV), Ti (4.7 keV), SS (6.7 keV), and Cu (8.4 keV). K-shell scaling theories have shown that the temperature of the plasma necessary to produce the K-shell varies with atomic number, $T_e = 0.3*Z^{2.9}$ eV, where Z is the atomic number and T_e is the electron temperature. This suggests that for Cu, T_e must be > 5 keV. In this presentation, variations observed in T_e and ion densities from the different load materials are presented. These plasma conditions are inferred from time-integrated, spatially-resolved spectra, and spatially-integrated, time-resolved spectra. Measured T_e confirm the scaling theory predictions, although in some cases the conditions are achieved only in isolated regions of the pinch. The impact of opacity on the K-shell emissions has been directly observed by comparing the line intensities from optically thin dopant materials with those of the main load constituents. Al loads show significant opacity; by contrast, Cu loads appear to be optically thin. Sandia is a multi-program laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under Contract DE-AC04-94AL85000.

Christine Coverdale
Sandia National Labs

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