Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Dynamics of electrode plasmas leading to current losses in post-hole-convolutes on the Z and ZR accelerators D.V. ROSE, D.R. WELCH, E.A. MADRID, R.E. CLARK, Voss Scientific, LLC, W.A. STYGAR, M.E. CUNEO, Sandia National Laboratories — The Z and ZR accelerators at Sandia National Laboratories utilize vacuum post-hole-convolutes, which join several magnetically insulated transmission lines (MITLs) in parallel, to drive z-pinch loads at current levels between 19 and 24 MA. Outer ($r \simeq 70$ cm) and inner ($r = 6$ cm) MITL B-dot probes are used to determine current losses in the combined MITL and convolute regions of the Z and ZR accelerators. It has been observed that current losses of 1.0 to 1.5 MA occur for initial load inductances of $\sim 2.5 - 3.0$ nH. For initial load inductances of $\sim 5.5 - 6.0$ nH, current losses of 5 MA or larger are observed. The assumption is that higher initial load inductances result in larger voltages in the MITLs and convolutes, which in turn results in more rapid electrode plasma formation. These issues are being addressed in 3D EM PIC simulations that include electrode plasma formation and dynamics [D. V. Rose, *et al.*, Phys. Rev. ST-AB **11**, 060401 (2008)]. The simulations have indicated that only small electrode plasma desorption rates (≤ 0.01 monolayers/nanosecond) are required to obtain current losses of order 1.5 MA on Z. New ZR convolute designs attempt to reduce the measured current losses. These designs are also being analyzed using PIC simulations.

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Date submitted: 21 Jul 2008 Electronic form version 1.4