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Recent Developments on the Pulsed Neutron Source and Diagnostics on Zebra ERIK MCKEE, University of Nevada, Reno — At the Nevada Terawatt Facility, neutron diagnostics are being added to the x-ray and optical diagnostics already employed on the Zebra pulsed-power z-pinch generator. The Zebra generator can produce plasmas approaching solid density over 100 ns timescales. It is hypothesized that production of neutrons on Zebra are through beam-like collisions in MHD instabilities in the z-pinch where there exist localized, intense electric fields. These fields accelerate deuterons to energies where the fusion reaction cross section becomes significant to produce neutrons. Palladium wires are used as the constraining media for deuterium gas in the fabrication of targets used on Zebra which produces short pulses of fast neutrons. The MCNP Monte Carlo particle transport code will be used in conjunction with neutron activation diagnostic to model detector effects from background scatter events and detector geometry. The neutron detectors currently measuring neutron yield include isotope activation using Silver, Indium and bubble-gel detectors. Also presented are nTOF detector geometries inspired by the difficulty in measuring TOF neutron signals in a low neutron yield, high gamma yield environment on Zebra. We report on a neutron yield exceeding 10^{10} neutrons per pulse measured using activation techniques and novel nTOF detector geometries being shaped by MCNP calculations to be fielded in the Zebra environment. Effort enabled by support from collaboration with LLNL and NSTec.

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