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Development and Characterization of Pulsed Neutron Sources at NTF ERIK MCKEE, BEN HAMMEL, UNR, DANNY LOWE, NSTec, RADU PRESURA, VLADIMIR IVANOV, SHOWERA HAQUE, AARON COVINGTON, JEREMY IRATCABAL, ZEPHYR MCCORMICK, TIM DARLING, UNR, NTF TEAM, NEVADA SECURITY TECHNOLOGIES, LLC COLLABORATION — Short duration, high-intensity pulsed neutron sources are being developed on the Zebra 1-MA/100ns pulsed-power generator. Ion beam collisions above threshold energies in a Z-pinch containing deuterium are the primary production mechanism of the 2.45 MeV neutrons. Deuterium treated palladium wire-arrays have been successfully used to produce neutrons on Zebra, but the deuterium content of the Pd wire storage diminishes rapidly. More traditional single-shell gas puffs have also been designed and implemented and allow for much higher repetition rates and ability to control the load composition; both pure deuterium and binary mixtures of krypton and deuterium gases were used. Both sources are capable of producing 1e10 neutrons per pulse. The yield and spectrum of the neutron pulse was measured by a combination of Ag and Y activation detectors and time-of-flight scintillator-PMT detectors. A model of the experimental area was used in the MCNP code to determine the scattering contribution and assist in calibration of the neutron detectors. Support for this work is provided by DOE/NNSA grant DE-NA0002075.

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