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Characterization of the Shielded Neutron Source at Triangle Universities Nuclear Laboratory CHAD HOBSON, Lynchburg College, SEAN FINCH, CALVIN HOWELL, RON MALONE, WERNEW TORNOW, Duke University — In 2015, Triangle Universities Nuclear Laboratory rebuilt its shielded neutron source (SNS) with the goal of improving neutron beam collimation and reducing neutron and gamma-ray backgrounds. Neutrons are produced via the ^{2}H(d,n)^{3}He reaction and then collimated by heavy shielding to form a beam. The SNS has the ability to produce both a rectangular and circular neutron beam through use of two collimators with different beam apertures. Our work characterized both the neutron beam profiles as well as the neutron and gamma-ray backgrounds at various locations around the SNS. This characterization was performed to provide researchers who use the SNS with beam parameters necessary to plan and conduct an experiment. Vertical and horizontal beam profiles were measured at two different distances from the neutron production cell by scanning a small plastic scintillator across the face of the beam at various energies for each collimator. Background neutron and gamma-ray intensities were measured using time-of-flight techniques at 10 MeV and 16 MeV with the rectangular collimator. We present results on the position and size of neutron beam as well as on the structure and magnitude of the backgrounds.

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