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Explosive Material Identification via Neutron-Induced Gamma Rays DAVID FREIBERG, MARC LITZ, Adelphi Laboratory Center — With the increase in the usage of improvised explosive devices, both vehicle-borne and buried, it has become increasingly important to quickly identify potentially explosive materials before they can be detonated. In a field test performed in January of 2014, 14 MeV neutrons generated in a deuterium-tritium reaction induced gamma emissions in explosive material targets. The resulting gamma rays were counted in LaBr3 detectors in both a time-binned associated particle imaging (API) mode and a repetitively pulsed mode. The details of the resulting data sets were analyzed, and gamma lines for carbon, oxygen, and nitrogen were identified in the spectra produced by both modes. Post-test noise reduction techniques included empty hole background subtraction, Compton background subtraction, peak area integration, and time-of-flight gating. The induced C, O, and N gamma line intensities and ratios were compared to the elemental weight ratios expected for each type of material. The composition results are indicative of the known elemental weights in the target materials. The statistics are limited because of the short, 20 second data collection periods, and would improve greatly with longer exposure times in the future.

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