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A Novel Neutron Detector with Homeland Security Applications¹ ASHTON BROWN, BART CZIRR, LAWRENCE B. REES, JOHN E ELLSWORTH, Brigham Young University Physics and Astronomy — We constructed and tested a neutron detector designed to detect spontaneous fission events from highly shielded sources. The detector consisted primarily of a 25.4 cm x 25.4 cm x 15.2 cm block of Eljen EJ-200 plastic scintillator coupled to four Adit 5-inch photomultiplier tubes. The signals from all the tubes were added following gain matching with a ⁶⁰Co gamma source. Using a ²⁵²Cf source, we measured the efficiency of the detector for various shielding types and thicknesses. The bulk of the signals from the Cf source is larger than those from the Co source. Data were acquired both with a Cd foil placed on the front of the detector and with the Cd foil removed. The difference of the pulse-height histograms for these two configurations was shown to be a good measure of the neutron source strength. Through single and double pulse analysis, we were able to confidently determine if a fission source was present and also if boron was being used in the shielding. This system is particularly well-suited for homeland security applications.

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