

Abstract Submitted
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Combating Nuisance Alarms Caused by the Ship Effect in ^3He Based Neutron Detection Radiation Portal Monitors A. OLIVERI, E. BUCKLEY, J. BORGARDT, Juniata College, R. KOUZES, E. SICILIANO, A. SEIFERT, L. WINDSOR, PNNL, JUNIATA COLLEGE COLLABORATION, PNNL COLLABORATION — Ship effect neutrons can present unique challenges in ongoing efforts to interdict illicit nuclear trafficking at border crossings. ^3He neutron proportional counters can generate false positives due to these neutron spikes, leading to cumbersome secondary radiation scans. This work explores methods to mitigate these nuisance alarms through a better understanding of how this effect is manifested in different materials, the role of a target's neutron density, and data analysis techniques to account for its effects. We used a mobile RPM equipped with ^3He tubes to detect the neutron flux from several commercial products containing NORM. While neutrons from illicit nuclear sources are Poisson in their frequency distribution, those from background are not. Ship effect neutrons deviated from a Poisson distribution when binned over 0.1 sec time intervals, however when averaged over 2.0 sec intervals the ship effect neutron spikes were washed out, recovering a Poisson distribution. These findings provide underlying knowledge regarding ship effect neutrons emanating from some common bulk materials, and suggest a data analysis algorithm to distinguish between innocent ship effect neutrons and neutron-emitting illegal sources.

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