

Portable Neutron Radiography to Track Fissile Material Transfers

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Recent improvements in the Nuclear Materials Identification System (NMIS) fast (1-GHz) time correlation processor and the incorporation of a portable (<30-lb) DT generator with an embedded alpha detector to time and directionally tag some of the emitted neutrons have permitted the use of the NMIS for imaging. The number of channels in the NMIS processor has been expanded to 10, and via pulse-width analyses, each channel now has the capacity to accept more than 1 detection channel. The time-of-flight transmission of the 14-MeV neutrons has been used to obtain an image of fissile objects in containers. This paper describes imaging measurements for a depleted uranium metal casting and a configuration of polyethylene and steel pipes in an AT400 container. This imaging capability has applications for nuclear material transfers between facilities, nuclear warhead authentication, traceability of nuclear components/parts in dismantlement, and counterterrorism.