

Pulsed DD Neutron Generator Measurements for HEU Oxide Fuel Pins Using Liquid Scintillators with Pulse Shape Discrimination

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Pulsed neutron interrogation measurements have been performed on high-enriched uranium (HEU) oxide fuel pins and depleted uranium metal with a D-D neutron generator (10^6 s^{-1}) at the Idaho National Laboratory Power Burst Facility. These measurements demonstrate the ability to detect HEU by coincidence counting using a pulsed source and liquid scintillators with pulse shape discrimination. The amounts of HEU measured were 4 and 8 kg in sealed 55-gal drums. Neutron and gamma events were counted during and after the pulse with the Nuclear Material Identification System and used to obtain the coincidence time distributions. Data collected include gamma-ray energy thresholds at low energy (160 keV) and high energy (3 MeV) to evaluate the ability to detect the presence of HEU using gamma-ray coincidences. This paper presents results from the measurements.