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**An Assessment of the Detection of Highly Enriched Uranium and its Use in an Improvised Nuclear Device
using the Monte Carlo Computer Code MCNP-5**
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In 2002 and again in 2003, an investigative journalist unit at ABC News transported a 6.8 kilogram metallic slug of depleted uranium (DU) via shipping container from Istanbul, Turkey to Brooklyn, NY and from Jakarta, Indonesia to Long Beach, CA. Targeted inspection of these shipping containers by Department of Homeland Security (DHS) personnel, included the use of gamma-ray imaging, portal monitors and hand-held radiation detectors, did not uncover the hidden DU. Monte Carlo analysis of the gamma-ray intensity and spectrum of a DU slug and one consisting of highly-enriched uranium (HEU) showed that DU was a proper surrogate for testing the ability of DHS to detect the illicit transport of HEU. Our analysis using MCNP-5 illustrated the ease of fully shielding an HEU sample to avoid detection. The assembly of an Improvised Nuclear Device (IND) – a crude atomic bomb – from sub-critical pieces of HEU metal was then examined via Monte Carlo criticality calculations. Nuclear explosive yields of such an IND as a function of the speed of assembly of the sub-critical HEU components were derived. A comparison was made between the more rapid assembly of sub-critical pieces of HEU in the “Little Boy” (Hiroshima) weapon’s gun barrel and gravity assembly (i.e., dropping one sub-critical piece of HEU on another from a specified height). Based on the difficulty of detection of HEU and the straightforward construction of an IND utilizing HEU, current U.S. government policy must be modified to more urgently prioritize elimination of and securing the global inventories of HEU.