Nuclear Forensics Using Gamma Ray Spectroscopy

Eric B. Norman
Department of Nuclear Engineering, University of California, Berkeley, CA 94720 U. S. A.

Much of George Dracoulis's research career was devoted to utilizing gamma-ray spectroscopy in fundamental studies in nuclear physics. This same technology is useful in a wide range of applications in the area of nuclear forensics. Over the last several years, our research group has made use of both high- and low- resolution gamma ray spectrometers to:

1. Measure fission fragment yields as a function of target nucleus and neutron energy [1,2]
2. Determine the yield of the Trinity nuclear weapon explosion
3. Observe fallout in the U. S. from the Fukushima nuclear reactor accident [3,4]
4. Identify the first sample of plutonium large enough to be weighed[5]

In this talk I will describe the results of all of these measurements.

[1] R. E. Marrs *et al.*, Nucl. Instrum. Meth. **A 592**, 463 (2008).
[2] A. Iyengar *et al.*, Nucl. Instrum. Meth. **B 304**, 11 (2013).
[3] E. B. Norman, C. T. Angell, P. A. Chodash, PLoSONE 6(9): e24330. doi:10.1371/journal.pone.0024330 (2011).
[4] A. R. Smith *et al.*, Journ. of Environmental Protection **5**, 207 (2014).
[5] E. B. Norman, K. J. Thomas, K. E. Telhami, Amer. Journ. Physics (accepted for publication)