

Abstract Submitted
for the HAW09 Meeting of
The American Physical Society

Improving the Accuracy of Neutron Multiplicity Counting

SCOTT STEWART, Abilene Christian University — Neutron Multiplicity Counting is an assay method used in non-destructive analysis of plutonium for safeguards applications. It is widely used in nuclear material accountancy by international (IAEA) and national inspectors. The method uses the measurement of the correlations in a pulse train to extract information on the spontaneous fission rate in the presence of neutrons from (α ,n) reactions and induced fission. There is currently interest in improving the accuracy of the technique in order to reduce the number of samples that need to be analyzed chemically. Therefore the achievable accuracy of the technique is being studied in detail. The accuracy of a neutron multiplicity measurement can be affected by a number of variables. Monte Carlo neutron transport simulations with MCNP have been done to understand how the density, isotopic composition, chemical composition and moisture in the material affect the count rate. These calculated count rates have been analyzed with the “point model” in order to determine the effect on the deduced plutonium mass. In practice, dead time in the electronics affects the count rate. Uncorrelated neutron sources have been measured in order to determine optimum settings for dead time compensation.

Scott Stewart
Abilene Christian University

Date submitted: 27 Jul 2009

Electronic form version 1.4