Measured 19F(α,n) with VANDLE for Nuclear Safeguards

WILLIAM PETERS, Univ. of Tenn. & ORNL, R.C.C. CLEMENT, US Air Force, M.S. SMITH, S. PAIN, M. FEBBRARO, S. PITTMAN, ORNL, S. THOMPSON, M. GRINDER, INL, J.A. CIZEWSKI, C. REINGOLD, B. MANNING, S. BURCHER, Rutgers, D.W. BARDAAYAN, W.-P. TAN, E. STECH, M.K. SMITH, R. AVETISYAN, A. GYURJINYAN, Notre Dame, M. LOWE, Univ. of Wisc. LaCrosse, S. ILYUSHIKIN, Col. Sch. of Mines, R. GRZYWACZ, M. MADURGA, S.V. PAULAUSKAS, S.Z. TAYLOR, K. SMITH, Univ. of Tenn. — One of the most promising non-destructive assay (NDA) methods to monitor UF6 canisters consists of measuring gross neutron rates induced by uranium-decay alpha particles reacting with the fluorine and emitting a neutron. This method currently lacks reliable nuclear data on the 19F(α,n) reaction cross section to determine an accurate neutron yield rate for a given sample of UF6. We have measured the cross section and coincident neutron spectrum for the alpha-decay energy range using the VANDLE system. This experiment had two parts: first at Notre Dame with a LaF3 target and and a pulsed alpha-particle beam, and second at ORNL with a windowless He-gas target and a 19F beam. The motivation for this measurement and cross section results will be presented.

1This work is funded in part by the DOE Office of Science, the National Nuclear Security Administration SSAA and the Office of Defense Nuclear Nonproliferation R&D, and the NSF.

William Peters
Univ. of Tenn. & ORNL

Date submitted: 01 Jul 2015  Electronic form version 1.4