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UF6 Cylinder Imaging by Fast Neutron Transmission Tomography

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The common use Non-Destructive Assay techniques for the determination of ^{235}U enrichment and mass of UF₆ cylinders used in the production of nuclear reactor fuel require prior knowledge of the physical distribution of the UF₆ within the cylinder. The measurement performance for these techniques is typically evaluated based on assumed bounding case distributions of the material. However, little direct data such as radiographic or tomographic images, regarding the distribution of the UF₆ within the cylinder is available against which to judge these assumptions. We have developed and tested a prototype active neutron tomographic imaging system employing an Associated Particle Imaging (API) neutron generator and an array of pixelated neutron scintillation counters. This system has been successfully used to obtain the 3-dimensional map of the distribution of UF₆ within a type 12B storage cylinder. Results from these measurements are presented and the potential performance and utility of this technique with larger 30B and 48Y cylinders is discussed.

Country or International Organization

USA

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