

Challenges and Opportunities in Nuclear Forensics Support Missions at Los Alamos National Laboratory

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Nuclear forensics is the analysis of intercepted illicit nuclear material and any associated material to provide evidence for determining the history of the confiscated material. Specific chemical and physical characteristics of the interdicted special nuclear material can be unique “fingerprints” or signatures for identifying manufacturing processes, intended use, point of origin, and route attribution. Total actinide content, actinide isotopic abundances, metal and non-trace element concentrations as well morphological/microstructural content are an integral part of a forensic investigation. Los Alamos National Laboratory (LANL) has been at the forefront of nuclear forensics research and is a support laboratory for the multi-agency Bulk SNM Analysis Program (BSAP). The pre-detonation actinide analytical chemistry team at LANL has recently participated in multiple nuclear material exchanges emphasizing inter-laboratory comparisons of analysis methods and measurement to maintain ISO 17025 accreditation for “operational” purposes. Results from one of those studies will be presented along with the associated bulk special nuclear material characterization capabilities. There is also a sustained effort to improve analytical chemistry methods through research and development in the areas of minor actinide analysis, separation science, and radiochronometry for actinide samples. This document had been reviewed and assigned publication number: LA-UR-15-26937