

Building a National Nuclear Forensics Library and Provenance Capability in the UK

The International Atomic Energy Agency Incident and Trafficking database [1] records cases of unauthorised possession, theft, loss, transport and other unauthorised activities involving nuclear and other radioactive material. Intercepted materials can be analysed using nuclear forensic techniques to provide information to law enforcement and government. In addition, an advanced materials analysis capability, coupled with an understanding of nuclear fuel cycle signatures, can assist with determining a material's history, for example, production processes, previous locations and intended use. A nuclear forensics library system that holds information on key signatures and material characteristics can be a powerful tool to support an assessment of the provenance of intercepted materials, particularly where there is a need to determine whether a material is consistent or inconsistent with a State's holdings of nuclear and radioactive materials.

It is argued that a nuclear forensics library does not need to contain details of a State's entire holdings (historic and current) and that adopting a concept of satellite libraries to hold a State's information on nuclear and radioactive materials is a more pragmatic and proportionate approach. This concept relies on a State being able to identify exactly where specific information and expertise is located. It is proposed that a matrix that identifies the key expertise domains and information holdings within a State is aligned with another that identifies subject matter experts within each identified domain, thus facilitating rapid access to appropriate information and expertise.

Even the most extensive nuclear forensics library system and access to expertise may not be enough to facilitate a timely provenance assessment. How the experts work together to reach a mutually agreed assessment needs to be understood together with an understanding of how any assessment will be communicated to senior stakeholders, especially when statistical terms and confidence are being described. The UK has been developing a detailed but generic provenance process that clearly describes the way information will flow during an investigation and that promotes interaction and discussion amongst subject matter experts from disparate facilities.

This paper describes the UK's recent work towards developing a nuclear forensics library, together with a detailed process for determining the provenance of nuclear and radioactive materials. This effort has been conducted in conjunction with developing expertise in identifying key signatures, developing data analysis tools and performing complex exercises to fully test the utility of the process.

[1] International Atomic Energy Agency, Incident and Trafficking Database (ITDB), IAEA, Vienna (2019) <http://www.iaea.org>

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