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A Technical Nuclear Forensics Capability to Support the Analyses of Illicit Nuclear and Radioactive Materials

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The International Atomic Energy Agency Incident and Trafficking database records cases involving the unauthorised use, transport and possession of nuclear and other radioactive material [1]. Intercepted materials can be analysed using nuclear forensic techniques to provide information to law enforcement. In addition, an advanced nuclear forensics capability supports the analysis of the material, and associated evidence, resulting in the identification of forensic signatures. These signatures can be exploited to assess the materials history, for example, production processes, previous locations and intended use.

In support of the UK nuclear forensic programme, a number of laboratories have undergone refurbishment [2]. This enables the total exploitation of nuclear and radioactive materials with associated contaminated items. Subsequent technical capability developments have further enhanced the advanced nuclear forensics capability at AWE. These include the purchase of new instrumentation, including a large geometry secondary ionisation mass spectrometer, and the adaptation and validation of current techniques to support nuclear forensic applications.

In addition, work is ongoing to develop statistical techniques to support interpretation of data from nuclear forensics investigations. The data obtained from the analysis of materials can be varied and requires a broad knowledge base, including both statistical tools and technical experts, to interpret. A collaborative approach is demanded using a variety of technical experts, from materials science, analytical science, metallurgy, fuel cycle process chemistry and data analysis backgrounds.

[1] International Atomic Energy Agency, Incident and Trafficking Database (ITDB), IAEA, Vienna (2003) http://www.iaea.org

[2] C.M. Watt and D.W. Thomas (2013). Development of a technical nuclear forensics capability to support the analyses of illicit radiological and nuclear materials. In book of extended synopses, IAEA International Conference on Nuclear Security: Enhancing global efforts (CN 203), IAEA-203/110, p221.

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