A technical nuclear forensics capability to support the analyses of illicit radiological and nuclear materials

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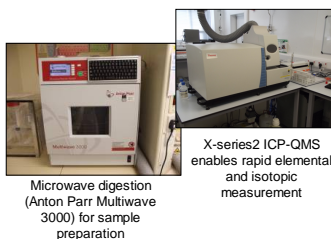
Nuclear Forensics @ AWE

Intercepted materials can be analysed using nuclear and conventional forensic techniques to provide information to first responders and law enforcement.

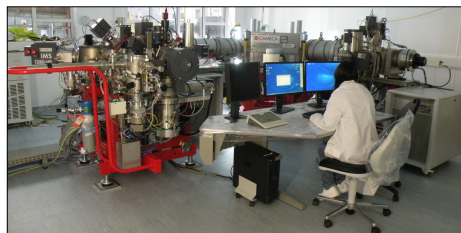### Intercepted materials and associated evidence

Technical Nuclear Forensics

Development of new and existing capabilities

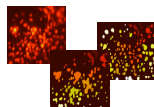- Modern instrumentation enables enhancement of capability to meet nuclear forensics requirements

Microwave digestion (Anton Parr Multiwave 3000) for sample preparation

X-series2 ICP-QMS enables rapid elemental and isotopic measurement

Collocated refurbished facilities

Conventional Forensics on contaminated items

Broad range of traditional forensic science examinations capabilities:

- Record photography
- Swabbing for DNA
- Trace evidence recovery
- Digital data recovery
- Fingerprint Development
- Questioned Documents

DNA swabbing

Indent writing

Fluorescence examination

Imaging (Trace) 1.00 mm

Examples of traditional forensic science examinations

Cameca 1280 HR HMR SIMS
Large Geometry Double Focusing (HMR) Secondary Ion Mass Spectrometer with simultaneous multi-ion detection
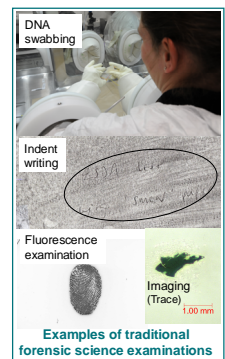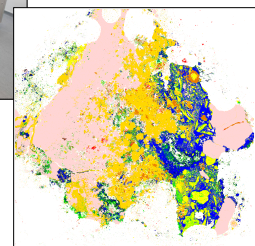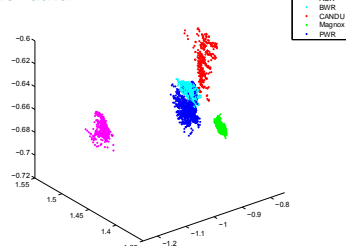
Nuclear safeguards applications using LG-SIMS with automated screening capabilities.
P. Peres, N Montgomery et al. Surface and Interface Analysis. Volume 45, Issue 1, p. 561-565, (January 2013)

Quantitative Mineralogy - QEMSCAN
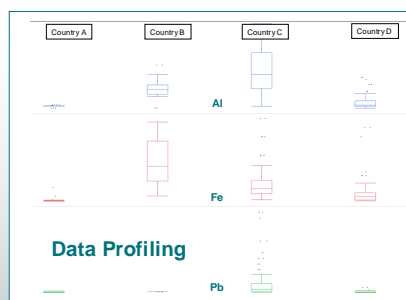Characterises associated particulate material to support geolocation of items.

An advanced nuclear forensics capability supports the analysis of the material data, and associated evidence data, identifying and utilising forensic signatures.
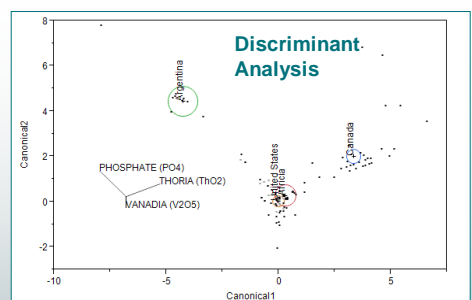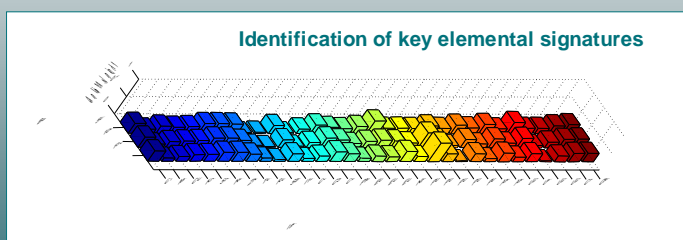
Data Profiling

Country A | Country B | Country C | Country D

Al

Fe

Pb

Discriminant Analysis

PHOSPHATE (PO4)
THORIA (ThO2)
VANADIA (V2O5)

Multivariate analysis of spent fuel data

AGR
BWR
CANDU
Magnox
PWR

Identification of key elemental signatures