

CASE STUDY: NUCLEAR FORENSICS

The United Kingdom Nuclear Forensics Library (UK NFL): Establishing the provenance of nuclear materials found outside of regulatory control

Since the early days of the global nuclear industry, one of the major challenges faced has been how to manage and control dangerous and potentially deadly radioactive materials. Now, after operating for many decades, the nuclear industry has produced a wide range of materials through research, development and operation of facilities. These materials range from medical isotopes and industrial sealed sources, through to weapons and warheads.

Increased risk

With the increasing production of these materials, the risk of loss of control has also increased. The potential to use these materials in terror related activities drives a demand for obtaining such materials, outside of normal regulatory control.

The threat posed by materials outside of regulatory control or MORC, was recognised by the International Atomic Energy Authority (IAEA) in the early 1990s. Following the collapse of the Soviet Union, an increase in incidents of smuggling radiological materials was reported. In response, the IAEA established the Illicit Trafficking Database, now known as the Incident & Trafficking Database to track these incidents. At the same time, the IAEA recommended that all countries who hold or use radioactive materials of any sorts, establish a Nuclear Forensic Library Capability to assist law enforcement with dealing with these illicit materials.

UK context

This capability also acts as a deterrent to people who may wish to use nuclear materials for nefarious reasons. This is important in the UK context as the drive to Net Zero requires the increase in nuclear power facilities and maintaining the confidence of the population in the safe management and handling of these materials is paramount to successfully delivering this vision.

Addressing the challenge required the establishment of a UK NFL covering the whole breadth of nuclear material in the UK, both defence and civil. Initially scientists at the Atomic Weapons Establishment (AWE) at Aldermaston were tasked by the Ministry of Defence to develop a UK NFL.

Development of the capability began a decade ago, but it was soon realised that access to the civil nuclear estate's information and subject matter experts (SMEs) was limited.

Collaboration

NNL stepped forward to bring access to that expertise and in full collaboration with AWE, established what is now recognised as a fully integrated single construct, the UK NFL. The UK NFL operates a hub and spoke model structure with NNL and AWE at the heart (the hub), being able to reach out across the wider nuclear industry (the spokes) via a network of contacts and contributing scientists.

Forming part of the wider UK response to the discovery of MORC or a nuclear or radiological incident, the UK NFL brings together experts from both the civil (NNL) and defence (AWE) arms of the UK nuclear estate to support delivery of a nationally important strategic threat reduction capability, vital to maintain public confidence in the safe use of nuclear materials.

Sitting at the heart of the UK NFL, NNL is demonstrably fulfilling its national laboratory role, working in close collaboration with AWE and collaborating internationally with a range of US National Laboratories and the IAEA, and being a key contributor to the Nuclear Forensics International Technical Working Group (ITWG) on nuclear forensics and wider RN threat reduction programmes.

Regular exercises

Regular joint exercising with AWE maintains the close levels of collaboration ensuring UK strategic assets and capability are aligned and available to meet national policy requirements. Significant cost benefits are also being realised for the UK taxpayer by refocusing existing assets and infrastructure to support any incident response rather than developing a completely new capability.

We are contributing to the wider security and threat response programmes, ensuring the future development of new build nuclear energy can progress with the full confidence of the UK public. A key contribution to the journey to Net Zero.