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How a decade of active interrogation work led us to the need for mono-energetic sources, and why?

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Active interrogation of shielded special nuclear material (SNM) for nuclear security applications has been the focus of a great deal of work since the beginning of the century by agencies worldwide. The Atomic Weapons Establishment (AWE) alongside the UK Government have maintained a programme to develop active interrogation techniques and technologies for border security since 2008. In this time, AWE – often in collaboration with other organisations – have trialled and assessed a range of radiation sources, radiation detectors, data acquisition systems, and data analysis tools. This body of work leads us invariably to the conclusion that currently available technologies, when correctly configured and integrated, can successfully detect shielded SNM in a wide variety of realistic configurations. Challenges however remain – both technological and operational – which limit the usefulness of active interrogation as a tool for securing a border.

We describe ten years of experimental campaigns: from bench-top trials to multimillion-pound demonstrator systems, show how the resulting data validates active interrogation as a technique, and discuss the remaining challenges and how mono-energetic radiation sources are a path forward for addressing them.

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