Dr. Sko

Steven Pike introduces ways to enhance effective simulation of real-life CBRN exercises

Shielding and inverse square law simulation is extremely realistic.

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Investing in the creation and deployment of a standardised suite of equipment was a masterstroke of strategic planning and execution and possibly unprecedented in CBRNe detection. DR-SKO (Dismounted Recon, Sets Kits and Outfits – pronounced Doctor SKO) is a pre-packaged, highly deployable equipment set

Many hundreds of millions are often expended on equipment, but equipment training resources are for some reason the Cinderella of the party. They are discussed with much enthusiasm but are rarely supported with a budget or formal programme of execution.

We provide wonderful tools, but surely the purpose of the acquisition was to ensure an operational capability can be effectively sustained and delivered? To achieve this we need to be certain that equipment is maintained to ensure operational readiness. We also need to have confidence that operators and commanders are operationally ready and well-practiced in the art of hazard identification and management. We must also ensure the provision of appropriate advice and recommendations.

Yes, a significant amount of money is spent on training exercises – but can better outcomes and value for money be obtained by ensuring the appropriate training equipment and assets are available? Can we save money by avoiding damage to real equipment? What if live training exercises provided greater value because attendees were proficient with their equipment and operational processes beforehand?

Are we 'Appy with Apps'?

Apps (applications) certainly have a role to play, and detection equipment can be replicated visually to some extent. But the human interface is always a compromise. An important aspect of training is the physiological impact of wearing the appropriate protective ensemble and the impact this has on the human interface elements of detection equipment, which is lost with an app. How would you feel if a surgeon about to operate on a loved one assured you they had nailed the procedure on the training app – and was looking forward to "doing it for real"?

Apps can be valuable when used as a learning management system (LMS)-based tool where students are presented with quiz-style questions relating to

equipment use and operational procedures, while centralised monitoring facilitates organisational assessment of progress and results.

Real-life training is best

What do we mean by 'real life'? The ultimate goal is to attend an actual incident, but this is not a role where on-the-job training is appropriate. However, every incident attendance is always an opportunity to learn and refine processes – but do we sit down and review post-incident to enhance learning as much as we should?

Closest to 'real life' is an exercise involving live CWAs (chemical warfare agents) or radiological sources. There are some superb facilities worldwide offering this type of experience, but do governments spend the significant taxpayer monies these live exercises cost to enable people to learn how to use their detection equipment? If we ensure operatives are proficient in the use of their detection equipment prior to attending live exercises, teams can focus on the specifics of hazard characteristics, process, protocol, communication and incident management.

Above Left: Also implemented as UDR13, dose and dose rate correlate with the Beta Gamma simulation probe.

Above: CWAs and TICs are effectively simulated without sieve pack consumables.

Above Right: A range of App detector simulators permit low-cost discrete field training.

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Live training also has limitations, however. Quantities of CWA substances involved are necessary small, and although radiological source activity can be employed at respectable levels, the student exposure limitations for reasons of safety have an impact on dose and dose rate exposure – and, therefore, reading-related decision-making experience.

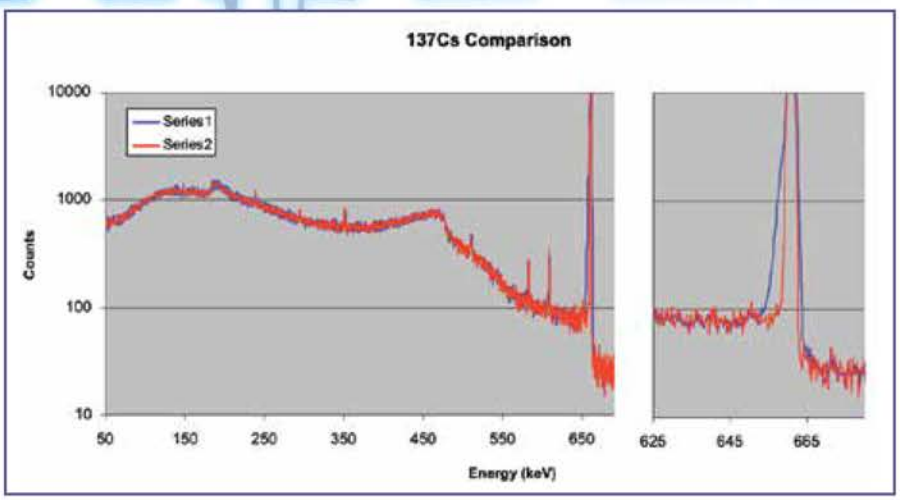
When we consider that many operations might be counter-terrorist-related. On home soil, the potential target location should ideally be incorporated within the training exercise – meaning any training option that may contaminate a potential crime scene or present administrative challenges might be ruled out. Large-scale incidents – what teams should also be training for – are extremely difficult to implement.

What practical options are there?

For a physical simulator to be accurate and capable of ongoing ILS (integrated logistics support), cooperation of the original detector manufacturer is important – because the simulator needs to accurately incorporate human interface factors (case, display etc) and elements of original equipment manufacturer's intellectual property.

CWA training

The M4 A1 JCAD (Joint Chemical Agent Detector) manufactured by Smiths Detection and known elsewhere as the LCD3.3 is a ➤



primary DR-SKO CWA detector that identifies specific CWAs and also incorporates limited TIC (toxic industrial compound) detection.

Operators need to be proficient in configuring the detectors mode (CWA, TIC, monitor, survey and confidence test) prior to operational deployment. They also need to understand the importance of sieve-pack consumable management, including the sieve-pack life indicator reset protocol.

While chemical simulants can be used to stimulate an actual detector, environmental, health and safety regulations and the need to generate specific CWA identification alerts make simulant use extremely challenging. This is especially so when weather effects are taken into account. While realistic, these impact on the learning experience an instructor may wish to convey. The use of technology such as ultrasound to represent a vapour can be very effective, as it can be contained and also simulate outgas through partially open doors and windows.

A well-designed simulator not only accommodates these training requirements, it can also monitor operator activity to determine if the actions have been correctly performed. This will avoid expensive damage to operational detectors, and enable the effects of persistency and partial and full decontamination to be realistically simulated. The simulation platform can be incorporated within alternative detectors to product a comprehensive CWA/TIC simulation capability, and can also be integrated with virtual reality training systems.

Top: Argon and LLNL will miniaturise and commercialise RaFTS for use with any spectrometer including back packs and portals.

Above: Correlation between real Cs137 and simulated spectra is almost indistinguishable.

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Radiological training

The real challenge with radiation training is exposing operators to the levels of hazard that really cause them to consider personal safety for all concerned, take appropriate initial action, and provide effective, considered advice and recommendations.

While radiation simulation has always resulted in a compromise (and in reality always will), recent technical advances have resulted in extremely accurate simulation of gamma emitters to provide highly realistic training scenarios. The implementation of safe, environmentally friendly electromagnetic signals for the simulation radionuclides, in conjunction with powerful signal analysis and processing, enables time/distance and shielding to be very well represented.

In search procedures involving sources hidden on different building floor levels, within crates, or even within vehicle trunks, for checkpoint exercises to very effectively implemented the student must be able to scan the vehicle trunk to determine the location of the source within. Readings will rise when the lid is opened, while training dosimeters ensure an understanding and appreciation of personal dose management.

Similar technology permits the simulation of alpha and beta contamination – including partial and full decontamination to be represented by suitable simulation probes.

The ability to represent specific or mixes of radionuclides permits spectrometers to be simulated. Recent technical developments such as the LLNL RaFTS (Lawrence Livermore National Laboratory Radiation Field Training System) enables operational instruments to incorporate a training mode.

Cost and value

Due to differences in market size, training simulators often cost more than detectors. However, the value they represent is significant when whole-life cost of ownership and exercise facilitation costs are accounted for. Evidence has also emerged that demonstrates greater live-exercise effectiveness due to better detector operation proficiency.

Steven Pike is Founder and Managing Director of Argon Electronics (UK) Ltd and holds a number of patents in the field of CBRN and hazardous material simulation.