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HazMat training systems

The Value of Simulators for CBRN Reconnaissance Vehicle Training

whitepaper



Photo courtesy CBRNS UK

The Value of Simulators for CBRN Reconnaissance Vehicle Training

A discussion of the options available for simulated CBRN Reconnaissance vehicle field training without the use of simulants or radioactive sources.

The CBRN reconnaissance vehicle is a special environment within which to operate.

Its primary role is to enable its crew to confirm the presence, or not, of a CBRN hazard and to report that information to the command structure for analysis to support decision making. The intelligence the crews convey is crucial, as it enables senior officers to make mission-critical decisions on where, and where not, to deploy their forces within the battle space.

While the working environment within a reconnaissance vehicle creates a cocoon of relative safety, it is not without its risks.

The reconnaissance vehicle must be manoeuvred within the threat area, subjecting its crew and commander to potential toxic hazard risk and the danger of direct attack by enemy forces.

There is also the risk of the failure of the vehicle's Collective Protection (COLPRO) system, which would require the crews to adopt their Individual Protective Equipment (IPE). To this end, respirator training simulators have a vital role to play in replicating such incidents and enabling instructors to determine that respirators are worn correctly, and in good time, to ensure crew safety.

Training is essential to ensure the effectiveness of the reconnaissance mission, both from the perspective of the vehicle crew and of those who are receiving, collating and interpreting the information. The CBRN Cell Controller and senior commanders can also form an important component of a more advanced exercise as their actions are totally dependent upon the quality of the information received from the reconnaissance vehicle. The success of the process depends entirely upon everyone functioning together as a team.

Critical elements of CBRN reconnaissance vehicle training might include:

- Where to deploy the reconnaissance vehicle
- Reconnaissance route planning
- Correct preparation and configuration of detection instrument
- Ability to read and interpret detection instruments correctly in the standard vehicle environment
- Ability to read and interpret detection instruments correctly while wearing IPE
- Ability to read and interpret detection instruments correctly under all protective conditions in daylight and at night
- Ability to accurately and clearly communicate the detector readings obtained to a third party
- Management of unusual situations such as instrument and vehicle failure

There are currently four options for simulated CBRN reconnaissance vehicle field training:

<h2 style="margin: 0;">INJECT</h2> <p style="margin: 5px 0 0 0;">Provide the crew with manual injects, either verbally (through the sending of pre-set communications by radio) or by presentation of signs the read which advise the readings to report upon.</p>	<h2 style="margin: 0;">EMBED</h2> <p style="margin: 5px 0 0 0;">Implement an embedded simulation capability within the vehicle central sensor computer, should one exist.</p>	<h2 style="margin: 0;">APPS</h2> <p style="margin: 5px 0 0 0;">Implement replica sensors based upon an "application."</p>	<h2 style="margin: 0;">SIM</h2> <p style="margin: 5px 0 0 0;">Implement replacement simulation sensors to integrate with the vehicle system architecture.</p>
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The following table indicates the merits of each option: ■ Good ■ Average ■ Poor

CONSIDERATION	INJECT	EMBED	APPS	SIM
Provide stimulus to prompt operator response				
Maintain representative environment within vehicle				
In vehicle threat display for operator				
Generate audio alerts to crew				
Interface with vehicle command system computer				
Replicate instrument preparation				
Replicate instrument use				
Replicate instrument failure				
Human factors (lights, sound, touch, feel)				
Enhanced training wearing respirators, gloves				
Creation of realistic training atmosphere				
No installation required				
Training when vehicle command computer fails				
Training in consumable replacements				
Vehicle command computer training				
Simulate COLPRO failure forcing crew use of IPE				
Detector use training				
Cost of acquisition				
Ongoing cost of ownership				

Simulating the threat:

With exception to INJECT, which requires written illustrative or verbal direction to simulate the threat, some form of electronic stimulation is required to influence the simulated readings to promote student response.

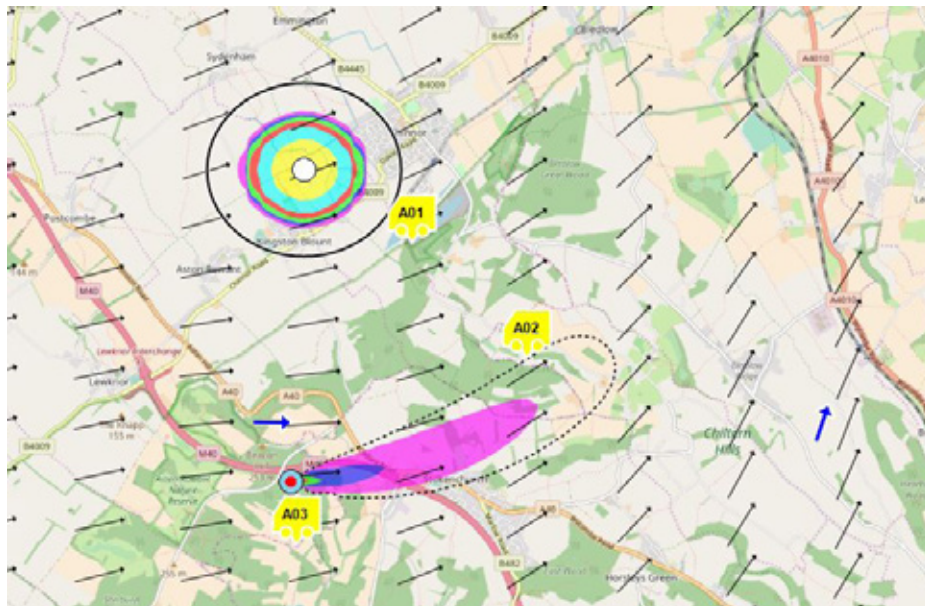
A simulated threat would ideally incorporate:

- Radiological threats.
- Chemical (CWA) threats.
- HazMat (non CWA) threats.
- Short puff releases.
- Continuous Plumes.
- Deposition / fallout.
- False positive indications.
- Persistency.
- Radioactive decay.
- Hidden radiological sources.
- Single and multiple threat activity throughout the exercise.
- Meteorological effects.

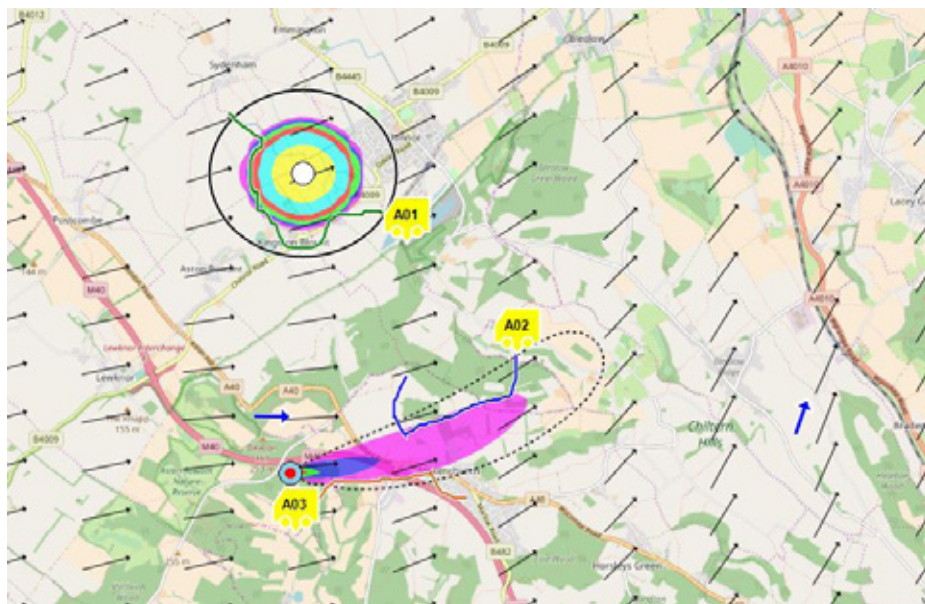
The simulation control system should also:

- Indicate and record the route taken by each vehicle.
- Indicate and record simulated instrument readings.
- Facilitate After Action Review (AAR) for exercise review.
- Support dismounted survey / reconnaissance activity.

PlumeSIM is an example of how such simulated threats may be incorporated within the training system.



A01, A02 and A03 represent three reconnaissance vehicles in the field surveying a radial radiological dispersion and chemical plume tracking with the wind shear.



After Action review (AAR) showing the survey routes taken by each reconnaissance vehicle (A01 in green, A02 in blue and A03 in red).

Exercise planners are able to generate a wide variety of scenarios with ease and save these as libraries for future use. PlumeSIM has the additional advantage of supporting Tabletop exercises to enable initial survey route planning and execution to be practiced cost effectively in house.

Conclusion

As the table above illustrates, there are a variety of CBRN reconnaissance vehicle simulation options to suit a range of budgets and requirements.

INJECT, while simple to install and cost effective in terms of acquisition and ongoing ownership, does little to deliver a truly realistic learning environment.

EMBED has to be incorporated within the operational vehicle computer which could require extensive testing to ensure operational capability is not compromised. And while it is permanently available, it does not provide actual detection instrument training and may not exercise all crew members equally.

APPS provide a reasonable compromise in terms of cost and functionality, however their installation represents an unrealistic environment. In addition the displays do not represent those of actual detectors - important if readability in different environments and all human factor challenges are to be replicated.

SIM requires specific temporary installation of simulation sensors which takes time. It is also the most expensive option. The use of replica instrument simulators however, does ensure that human factors such as switches, displays and acoustic alerts are accurately represented, thus providing the most realistic training environment possible without the use of live chemical warfare agents, biological simulants or radioactive sources. Additionally, SIM provides an accurate way of recording crew actions and mistakes for use in After Action Review (AAR) debriefs.

About Argon Electronics

Argon Electronics was established in 1987 and has since become a world leader in the development and manufacture of hazardous material detector simulators, most notably in the fields of military chemical, biological, radiological and nuclear (CBRN) defense. Our simulators have applications from civil response to unconventional terrorism and accidental release, and international treaty verification, with a growing presence in the nuclear energy generation and education markets.

Contact us

Contact Argon Electronics to discuss any of the information contained within this eBook, or to discuss your simulation training requirements.

Telephone: +44 (0)1582 491616

Fax +44 (0)1582 492780

USA: 571 210 1258 (7am to 1pm EST)

Email: argon@argonelectronics.com