

Area of concern

Brian O'Shea looks at the work being done by the UK and Canada in the area biological defence

No CBRN sensor really likes being on the move, since all, at heart, are scientific measuring devices; the closer you can get to laboratory conditions the happier they are. Of all of them, however, the ones that tolerate the outside world least are biological detectors. Introducing a sample into a controlled, sterile environment is what biological detectors like, not being thrown around in the back of a Humvee or required to sit out in a field enjoying what nature can throw at it. Yet the likely threat is unlikely to respect these problems; biological agents dislike sunlight, meaning an attack is more likely to happen at night when the atmospheric conditions are better and a covert release less likely to be noticed. Equally, since we are out of the Cold War paradigm, it is unlikely there will be shells

lying around with pools of liquid gently aerosolising next to them. A bio release will need to be picked up by static detectors that will have been in place for some time to allow them to get their background readings.

The two best known biological area-detection systems in service currently are the Portal Shield system that used was in Ali Al Salem in Kuwait, and the BioWatch system that has been installed in major US cities – although both have had their problems. Thankfully, both of their major problems have been one of manpower, with a shortage of trained staff to either operate the system or to pull the required amount of samples, but both have been expensive and fail to provide a feeling of either safety or high technology. Yet it is not just the US that is interested in solving this problem; both the UK and Canadian military are working on their own solutions – hoping to solve some of the major problems inherent in this field.

Undue alarm

Primary among these is the issue of false alarms. Biological detectors seek out biological material in the atmosphere, of which there is a superabundance – so it is no surprise that the law of averages throws something out on a regular basis that looks a little bit like something else. The better the detector, the better its powers of discrimination are, yet this discrimination is often based on a clean sample (which somebody has to collect and clean) presented to laboratory equipment – the BioWatch approach – or on setting the level of detection very high (only alarm when really high concentrations are reached) which means that covert, small-scale attacks will get through.

The UK and Canadian solution to this problem is to try and network the sensors together, so that operators can extrapolate from the strategic picture whether other sensors should also be alarming. While this still relies on trained operators, because they can control the whole network rather than a single sensor, the drain on skilled manpower is minimised. The UK's version, Integrated Sensor Management System (ISMS), also links chemical and radiological sensors into its bio-net providing all round CBR detection. The CBRN Integrated Project Team (IPT)

feels that some of the sensor fusion work being done has helped deal with some of the false alarm issues. According to a CBRN IPT representative: "Results to-date are promising. However, we (the project team, Dstl and Serco) are just embarking on an intensive series of tests/exercises and trials both 'hard' and 'synthetic' to fully understand the performance of the ISMS system."

The UK system will allow a lot of automatic sensor interrogation and sensor fusion to try and stop false alarms being brought to the attention of the Commander. The Canadian version, called Vital Point Bio Sentry (VPBS), will utilise more trained operators. "The individual detectors in a VP Bio Sentry system will be networked to a central command-and-control unit. Trained operators will provide initial analysis and responses to all alarms. If the alarm is considered valid after the initial analysis, the operator will transmit this information electronically to Canadian Forces' command-and-control systems where it will be considered by military commanders. In concert with information provided by intelligence sources and other types of sensors, appropriate additional responses will then be taken," said Lt. Cdr Kevin Johnston, Vital Point Project Director and Canadian Forces Bio Detection and Identification Capability Manager.

While the UK system will utilise chem and rad, as well as bio, detectors, Canada's will just provide bio input – chem. and rad may well feed their data into the larger network at a future date. Yet Vital Point is not the only biological detector that the Canadians will have in service does this mean that Vital Point will integrate into the future parts of Canada's proposed 'Bio-Warn' programmes? Will VP give the sensor fusion or is it a different programme. Lt. Cdr. Johnston explained, "The long-term intention for bio detection within the CF is to provide a layered detection capability of standoff, point and personal detection. These sensors will be networked with the goal of passing information from sensor to sensor automatically. The compilation and processing of information provided by the VP Bio Sentry System, and other Canadian Forces CBRN sensors, will be done by a system being acquired by the CF Sensor



Biral's Verotect is the biological detector for the UK's ISMS ©CBRN World



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Integration and Decision Support System project. This system will be capable of compiling pertinent data, modeling the incident and initiating appropriate warning and reporting messages.”

While both systems provide the same function there is a different scale, with the UK looking for a 5km x 5km site and the Canadians for a site with a diameter of 1km. Yet the scale of the site is immaterial to the amount of detectors; arguably the Canadians could pack the same amount of detectors into their 1km diameter as the UK fits into their 25km site – it all depends on the density of the detectors.

Unfortunately, this information is difficult to extract. “The basic ISMS building block retains the coverage of a 5km x 5km site. The number of sensors required has been determined, but the information is not for release,” said the UK’s spokesman. Meanwhile, Canada pointed to the impending contract award. “The designated Vital Point is defined as a circular area 1km in diameter. As the contract award is pending announcement I cannot specify the number of detectors that will be employed in the VP area. Once contract award is announced, however, this information can be provided.”

To ID or not to ID

Neither ISMS nor VPBS is attempting identification – or detect-to-treat – which currently tends towards wet chemistry and sample preparation; instead they are going for the more generic detect-to-warn. This is slightly further complicated by the UK’s choice of detector – Biral’s Verotect – which, while unable to identify an agent, uses ASAS size and shape detection which offer a degree of scrutiny that many fluorescence detectors lack. ISMS is going to be a “capability” rather than a system, and while Verotect is currently the ISMS detector there is nothing to say it will be in ten years, for example. The CBRN IPT spokesman said, “The trials to determine the detailed performance of VeroTect are just beginning. We have, however, demonstrated that ISMS is truly ‘plug and play’ by successfully connecting, and reading the outputs, from VeroTect and various current UK in-service chemical and radiological sensors. This achievement, will give us the capability to deploy ISMS with such sensors in addition to the VeroTect bio detector.”

Unfortunately, Lt. Cdr. Johnston was

able to divulge little information on the detection capability of VPBS either, because of the imminent contract award. Previously the plan was to perform detection, and any verified alarm would see a sample sent off to a laboratory or some form of field verification attempted. While that concept worked on Canadian territory, on operations it might be difficult if Canada didn’t have a lab of their own in the field. Other nations’ labs might be loathe to take a sample that their scientists or soldiers didn’t capture, and there is the danger that Canada might not be able to see all the results if it turned out to be positive (evidence and national security can put pay to goodwill). Lt. Cdr. Johnston suggested that this approach had been changed slightly. “The VP Bio Sentry system will provide a provisional level of identification in the field. This level of identification will be sufficient for field commanders to take appropriate action. As required, a more detailed identification will be conducted by a designated laboratory,” he said. “This could be a field lab or a national facility provided by Canada or our allies. The specific laboratory location is dependent upon resources assigned to each operation, he concluded.” There is also the aim to feed the data back to Canada to have it interrogated by the scientific community – if the Commander thinks it is justified.

In terms of modularity, Lt. Cdr Johnston added, “The concept for the VP Bio Sentry Project is to acquire modular equipment that will allow for upgrades as technical improvements occur. The acquisition of any improved equipment to replace existing components of the VP Bio Sentry system will be subject to a negotiation process and there is no specific project to purchase any improvements within the next five years.”

Yet the road to area bio detection has been paved with good intentions, and both countries have suffered delays in getting the project into service and through the procurement process. In September 2003 the initial rollout date of ISMS was announced in the in-house magazine of the Defence Procurement Agency, Preview, as late 2005. It was then announced that it would be delayed until late 2006; currently the CBRN IPT has not decided to go for third time lucky. “2005 may have been an early aspiration,” said the IPT spokesman, “but it has never been

a scheduled ISD. The ISD target against which we will be judged is set at Main Gate approval and it is not our policy to release detailed ISD information in advance. The project has met some technical difficulties within the sensor interface unit which have now been overcome.”

Equally, the contract award for VPBS was supposed to be the first quarter of 2006, and is now likely to be first quarter of 2007. Lt. Cdr. Johnston explained the delay. “The VP Bio Sentry project has followed the acquisition process as established by the government of Canada. To ensure that all requirements are met, each government department involved in the contracting process has conducted its respective review of the latter. Due to circumstances beyond the control of the project staff, this review has taken longer than originally planned and did not meet the forecast contract award date. Although initial delivery will meet the project timelines, it will not be in the quantities required for initial operational capability as defined by the project office. Given built-in flexibility, it is anticipated that the final operational capability will meet the forecast project timelines.”

It is always the case that any complicated sensor management and delicate sensor project has to be seen to be believed, but that is definitely the case with area biological detection. The operation of Portal Shield was not as smooth as had been desired, and this was entirely due to the difficulty of area detection. Sensor fusion has to hold the key to eradicating the costly false alarms, yet systems integration and sensor management is not the most straightforward of projects either. Yet the speed of manoeuvre on the battlefield does indicate that the only two strands of bio detection which will work are syndromic surveillance and area detection – point detection in isolated pockets is likely to be counter-productive. Currently, many chemical alarms are checked with complementary technology – CAM with AP2C and vice versa – but the weight and logistics of bio detection currently makes this costly and difficult, if not impossible. Area detection will have to hold the key for biological detection and there will, undoubtedly, be further setbacks before a system can emerge that can provide both commander and soldier with the confidence that they are protected.