Science and Technology in a Dynamic CBRN Landscape

By Mr. Victor Ellis

"If I had it to do over again, I'd have gone for the ports."

—Saddam Hussein (following Gulf War I)

Twenty-first century science and technology continue to evolve in joint efforts between military forces and commercial industry. In response to Joint Vision 2020's guidance on the continuing transformation of America's armed forces and the warning that future adversaries may pursue an asymmetric advantage by identifying key vulnerabilities to the United States and interests abroad,[1] the Army's Chemical Corps maintains caution while ever determined to achieve the technological edge required to mitigate chemical, biological, radiological, and nuclear (CBRN) acts of aggression. As terrorists seek to devise concepts and capabilities to strike or exploit their cause, procedural and technological enhancements in military and commercial equipment keep pace with global threat scenarios.

As Secretary of Defense Donald Rumsfeld wrote in his Annual Report to the President and Congress in 2003, "Future adversaries are seeking capabilities to render ineffective much of the current U.S. military's ability to project military power overseas. Today, U.S. power projection depends heavily on access to large overseas bases, airfields, and ports."

Joint Vision 2020 warns, "The potential of such asymmetric approaches is perhaps the most serious danger the U.S. faces in the immediate future..."[2] The vital importance of seaports of debarkation (SPODs) to U.S. power projection capability makes them an attractive target for a chemical-biological (CB) attack. As strategic choke points, their closure or reduced operational capability can significantly degrade the military capabilities of the United States in the event of a crisis. As such, SPODs in immature theaters are considered strategic centers of gravity requiring careful protection and commitment of resources to ensure that they are adequately protected and, if attacked, quickly restored to operation.

The ability to defend SPODs against CB, toxic industrial chemical (TIC), and toxic industrial material (TIM) attacks is an operational necessity for all unified combatant commands during power projection and force deployment operations. Most SPODs are controlled by host nation commercial or government entities and have little or no U.S. military or civilian presence and no pre-positioned CB defense equipment. This lack of personnel and equipment leaves SPODs vulnerable to CB, TIC, and TIM attacks during the initial phases of force projection operations. Therefore, the ability to protect against, immediately react to, and minimize the impact of a CB attack is critical to maintaining the flow of forces and materiel into any theater worldwide.[3]

The Defense Threat Reduction Agency's Advanced Concept Technology Demonstration (ACTD) for Contamination Avoidance at Sea Ports of Debarkation (CASPOD) addresses critical military needs for ensuring that our adversaries are not successful in denying U.S. forces access to seaports during power projection operations. To evaluate proposed solutions to meet military needs, intense user involvement is required. "ACTDs place mature technologies in the hands of the user and then conduct realistic and extensive military exercises to provide the user an opportunity to evaluate utility and gain experience with the capability. The process provides the users a basis for evaluating and refining their operational requirements, for developing a corresponding concept of operations (CONOPS), and ultimately for developing a sound understanding of the military utility of the proposed solution before a decision is made to enter into the formal acquisition process. Furthermore, a key objective of ACTDs is to provide a residual operational capability for the warfighter as an interim solution prior to procurement."[4]

The CASPOD ACTD explores innovative technologies and systems to protect operations at strategic transportation facilities. Advances in equipment focus on the identification of technologies that can be used prior to, during, and after an attack to mitigate the effects of a CB agent, TIC, or TIM on the force flow

and operating tempo during the initial stages of power projection operations at SPODs. The goal of the CASPOD ACTD is to identify, provide, and improve technologies, strategies, and tactics to mitigate the effects of these incidents through the following technological arenas:

- **Warning/Situational Awareness—**A networked system of detectors that can detect hazards and warn SPOD command centers, as well as combatant command joint operations centers.
- **Detection (Standoff) Equipment—**Detection equipment (CB, TIC, and TIM) that provides 360-degree standoff protection.
- **Individual Protective Equipment—**Inexpensive and easily donned or doffed individual protective ensembles for use by civilian host nation support personnel and other SPOD essential work force, as well as U.S. military personnel who may arrive without full individual protective equipment.
- **Collective Protection Shelters—**Easily erected or permanently installed collective protective shelters for SPOD command and control, medical support, and work or rest relief areas.
- **Decontamination Equipment—**Equipment and decontaminants necessary for the rapid decontamination or neutralization of CB agents, TICs, and TIMs on personnel, equipment, and large areas of terrain.

ACTDs "are sized and structured to provide clear evaluation of military capability. The user, with support from the operational test agencies, defines the measures of effectiveness and performance that allow effectiveness and suitability to be characterized. Data collection is tailored accordingly. The quantity of systems in the ACTD is sufficient to provide a valid assessment of the capability, or simulations are used to expand the battlespace and forces involved in the exercise. The user provides, or at least approves, the planned operational exercises which typically include red, as well as blue, forces."[5]

"Many ACTDs are based on advanced technologies which may permit, or even demand, new CONOPS, tactics, and doctrine in order to realize their maximum potential. The ACTD provides a means to develop, refine, and optimize these war-fighting concepts to achieve maximum utility and effectiveness. Each ACTD is managed by a lead service or agency developer and driven by the principal user sponsor. As a general rule, but not as a requirement, the user sponsor is usually a unified commander. The Joint Requirements Oversight Council (JROC) will make a recommendation to the Deputy Under Secretary of Defense for Advanced Systems and Concepts (DUSD AS&C) regarding the lead service and user sponsor as part of the JROC review of candidate ACTDs. All user and development organizations are represented on an oversight group, chaired by the DUSD AS&C. The purpose of this group of senior representatives is to provide a decision-making body that can respond quickly to significant program issues that require management direction or approval and to assure effective, timely communications among the leadership level of the key participating organizations."[6]

The U.S. Army Chemical School, having jointly partnered with the Defense Threat Reduction Agency on new equipment assessment, seeks a common goal to provide soldiers with an objective, reproducible, and adaptable means of effective formulation processes and other assessment methods for increasing existing defense capabilities. As both military forces and commercial industry's exploration into state-of-the-art technologies continue to evolve, strategies for developing measures of effectiveness and performance are continually being formulated to help assess new equipment technologies and improvements in training, doctrine, CONOPS, and leader development integration. The focal point for modernization is, and always will be, on an ever-increased operational war-fighting ability in order to provide measurable increases in existing defense capabilities, both at home and abroad.

Endnotes

[1]Joint Vision 2020, <*http://www.dtic.mil/jointvision/jvpub2.htm*> (12 January 2004).

[2]Ibid.

[3] Defense Threat Reduction Agency, "Contamination Avoidance at Sea Ports of Debarkation (CASPOD) Advanced Concept Technology Demonstration (ACTD)," 4 December 2002, <*http://www.dtra.mil/cb/caspod/cb_index.html*> (12 January 2004).

[4]Integrated Chemical and Biological Defense Research, Development and Acquisition Plan: Chemical & Biological Point Detection Decontamination Information Systems, April 2003, <*http://www.nti.org/e_research/official_docs/dod/2003/dod0403.pdf*> (12 January 2004).

[5]Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, Introduction to ACTDs, 7 May 2002, <*http://www.acq.osd.mil/actd/intro.htm*> (12 January 2004).

[6]Ibid.