ARMY CHEMICAL REVIEW

The Professional Bulletin of the Chemical Corps
January–June 2006

THE CHEMICAL CORPS: EXPANDING THE BOUNDARIES OF THE CBRN BATTLEFIELD

HEADQUARTERS, DEPARTMENT OF THE ARMY
Approved for public release; distribution is unlimited.
PB 3-06-1

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Army Chemical Review (ACR) (ISSN 0899-7047) is prepared twice a year by the US Army Chemical School, Fort Leonard Wood, Missouri. *ACR* presents professional information about Chemical Corps functions related to nuclear, biological, chemical, smoke, flame field expedients, and CBRN reconnaissance in combat support. The objectives of *ACR* are to inform, motivate, increase knowledge, improve performance, and provide a forum for the exchange of ideas. This publication presents professional information, but the views expressed herein are those of the authors, not the Department of Defense or its elements. The content does not necessarily reflect the official US Army position and does not change or supersede any information in other US Army publications. The use of news items constitutes neither affirmation of their accuracy nor product endorsement.

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Personal subscriptions are available through the Superintendent of Documents, PO Box 371954, Pittsburgh, PA 15250-7954.

POSTMASTER: Send address changes to Army Chemical Review, 464 MANSCEN Loop, Suite 2661, Fort Leonard Wood, Missouri 65473-8926.

By Order of the Secretary of the Army:

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Chief of Staff

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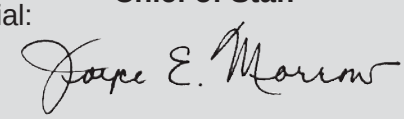

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ARMY CHEMICAL REVIEW

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Headquarters, Department of the Army

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FROM THE SCHOOL

In a continuing effort to provide timely information about ongoing initiatives and activities at the United States Army Chemical School, periodically updated information is available at *<http://www.wood.army.mil/usacmls/>*.

Chief of Chemical

Brigadier General
Stanley H. Lillie

2005 was a very busy and challenging year for the US Army Chemical Corps and Chemical School! As the Corps transforms, our biggest challenges lie ahead—in 2006 and beyond. We must now focus on continuing to meet the expanding and changing contemporary operational environment (COE). We have the responsibility to transform the Corps to meet the needs of the Army and the joint warfighting effort. The bottom line—the Chemical Corps is the Department of Defense's leader in chemical, biological, radiological, and nuclear (CBRN) defense.

As we publish this edition of *Army Chemical Review*, we find our Dragon Soldiers deployed almost everywhere we have Soldiers. They are executing missions in support of Operations Iraqi Freedom and Enduring Freedom and homeland defense. As I talk to commanders in the field, they—without exception—tell me what a great job our Dragon Soldiers are doing. I want to say to each Dragon Soldier that I am very proud of you and appreciate your service as individuals and as a Corps.

CBRN passive defense was the cornerstone mission of the Cold War. Today, we are operating in a new and changing environment. We can no longer simply protect the force to preserve freedom of action against chemical warfare agents. We must prepare for the full spectrum of CBRN threats, to include toxic industrial chemicals (TICs) and toxic industrial materials (TIMs). When I use the term "chemical hazards", I am referring to the full range of chemical hazards, which includes TICs and TIMs.

Our vision is for the Army to have the capability to operate and function completely unhindered by CBRN threats. This ability will allow the combatant commanders (COCOMs) to deploy and use their forces at 100 percent efficiency. To achieve this, we must provide our Soldiers with the training, equipment, and knowledge they require. We must leverage technology, leadership, and training to provide the COCOMs with the right capabilities to be effective and viable in the joint warfighting effort.

I believe that the Chemical Corps provides the Army with a big return on a small investment. Even though we are a small branch—comprising less than 2 percent of the total Army—we make a significant contribution. The Army and COCOMs rely on the Chemical Corps to provide expert advice in the areas of contamination avoidance, CBRN battle management, research and development, individual protection, restoration capability, collective protection, and obscuration. We provide mission capabilities that no other organization is equipped, organized, or trained to provide.

Our core competencies enable the Regiment to make an even greater contribution, and they are based on four pillars:

- Weapons of Mass Destruction (WMD) Elimination—removing an adversary's capability to develop and employ WMD.
- Battlefield Science—training Dragon Soldiers in the fundamentals of the physical sciences to expand their knowledge and understanding of what we do.
- CBRN Passive Defense—protecting the force to preserve freedom of action, not just against traditional chemical warfare agents, but against the full spectrum of CBRN threats.
- Consequence Management—restoring key capabilities to military forces, civilians, and allies.

The Chemical Corps is the force of choice for these missions. To increase our capabilities, we are transforming our decontamination platoons by adding capabilities for hazardous material response. The new hazard response and decontamination platoons (HRDs) will maintain current decontamination capabilities and provide new capabilities to—

- Conduct dismounted, full-spectrum CBRN reconnaissance and identification.
- Perform WMD sensitive-site assessments.
- Provide reach-back to enable on-site assessments.
- Enhance consequence management capabilities, to include mass-casualty decontamination.

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Regimental Command Sergeant Major

Command Sergeant Major Patrick Z. Alston

The theme for this issue—"The Chemical Corps: Expanding the Boundaries of the CBRN Battlefield"—is timely and relevant for every Dragon Soldier. It should be obvious that we, as a Corps of dedicated professionals, are expanding what we do and how we do it. Over the past few months, I have traveled extensively around the world to see Dragon Soldiers in action and to meet with our Army's leaders to discuss the things that affect every chemical Soldier in the field. I am convinced more than ever that we are moving in the right direction and are expanding our own boundaries. Here are some of the things that I have been involved in to ensure that the Chemical Corps stays on the cutting edge of emerging technology and in line with where the Army is heading.

Brigadier General Lillie and I attended the Joint Program Executive Office Quarterly Review in August 2005. During the seminar, we received information on new equipment to be fielded to the Corps in the future. We also visited Fort Leavenworth, Kansas, to provide instruction at the Command Sergeants Major Designee Course and to brief the future of the Corps to the chemical officers attending the Command and General Staff College. I have been to the Combined Arms Center at Fort Leavenworth to assist personnel with revisions to the Advanced Noncommissioned Officer Course (ANCOC) and Basic Noncommissioned Officer Course (BNCOC). Recently, we completely reviewed and approved a new BNCOC program of instruction that ensures that our Dragon Soldiers receive training in skill sets that will provide them with the knowledge to advise their commanders well in the Global War on Terrorism.

In the past few months, we have seen two new chemical units activated. The Commandant and I went to Fort Hood, Texas, to witness the stand-up of the 31st Chemical Company (Biological Integrated Detection System [BIDS]) and then traveled to Fort Lewis, Washington, to observe the activation of the 110th Chemical Battalion. We also traveled to US Army Training and Doctrine Command (TRADOC) headquarters to watch General Wallace assume command. During our visit, the Chemical Corps was highlighted as one of the leading Corps—training Soldiers to be better-prepared to fight on today's battlefield. In the career management field (CMF) review, we are looking stronger than ever. Over the next two to three years, the Corps will be authorized up to 7,200 Soldiers. These are exciting days for the Chemical Corps!

I have been working closely with the Commandant on the forthcoming restructuring of Basic Combat Training and Advanced Individual Training in the 82d Chemical Battalion at Fort Leonard Wood, Missouri. The purpose of this TRADOC-mandated action is to get more NCOs into warfighting units in the field. Also, in December 2005, I had the privilege of presenting Sergeant Major Michael Croom, the Army G1 Sergeant Major, with the Honorable Order of the Dragon award during a ceremony at Fort Leonard Wood. He was nominated and approved due to his numerous contributions to the Chemical Corps, specifically in pushing the Automatic Promotion to Sergeant Policy through the Department of the Army. This policy has helped hundreds of 74D NCOs, working mostly one deep in combat arms units, get the promotions that they deserve in a timelier manner. For the first time in the history of the Corps, we are at 97 percent strength on skill level 20s.

The homeland defense missions, historically carried out by our reserve component units like Weapons of Mass Destruction–Civil Support Teams (WMD-CSTs), and the force protection missions of our units in overseas theaters are not going away any time soon. We must have Dragon Soldiers of all ranks up to speed to ensure that wherever they are sent, they are well trained and ready to accomplish the mission to standard. As a result, there have been several changes in and around the schoolhouse to ensure that our Soldiers are more prepared to operate and lead in today's technically driven environment. Students attending the Chemical Captain's Career Course and ANCOC now find themselves in a brand-new, sensitive-site exploitation (SSE) scenario at the Chemical Defense Training Facility. There is an active movement to incorporate this kind of training at the BNCOC level in the near future. We are also looking at expanding the courses in the NCO education system and Advanced Individual Training by providing basic

(continued on page 4)

("Chief of Chemical" continued from page 2)

We've begun the doctrine, organization, training, materiel, leader development and education, personnel, and facilities analysis required to effect this transformation. This issue also finds us at a key crossroad for Chemical Corps transformation. Not only are Army and chemical units in the field transforming, but the institutional Army is also transforming—and the Chemical School is no exception. At Fort Leonard Wood, the construction of the First Lieutenant Joseph Terry CBRN Responder Training Facility continues on schedule. This facility will not only provide world-class training for our Weapons of Mass Destruction–Civil Support Teams (WMD-CSTs), but will also provide the same level of training for Soldiers in Technical Escort units; Chemical Reconnaissance Detachments (Special Forces); and other units with missions to support civil authorities, perform WMD elimination, or conduct consequence management missions.

In our Chemical Defense Training Facility (CDTF), we are transforming from the standard M8 paper and M256 tasks that many of you remember. The CDTF is conducting advanced sensitive-site exploitation scenarios for the Captain's Career Course and the Advanced Noncommissioned Officer Course. We will have the Officer Basic Courses and Basic Noncommissioned Officer Courses executing similar missions this summer. The goal is to have every CBRN Soldier train on sensitive-site exploitation and assessment in the CDTF.

My expectation is that every chemical Soldier will be a professional CBRN defense expert, unsurpassed tactically and technically, and imbued with the Warrior Ethos! Dragon Soldiers and leaders must be flexible enough to adapt to any situation, in any operational environment, in the presence or absence of CBRN hazards, and in or out of combat.

As a Corps, we have a lot to look forward to in the coming months and years. Chemical Corps transformation and these new initiatives present great opportunities for the Corps. I would like to make a special appeal to all Dragon Soldiers and everyone who supports the Corps mission to make the Chemical Corps Vision a reality as we move forward to meet the challenges of the future.

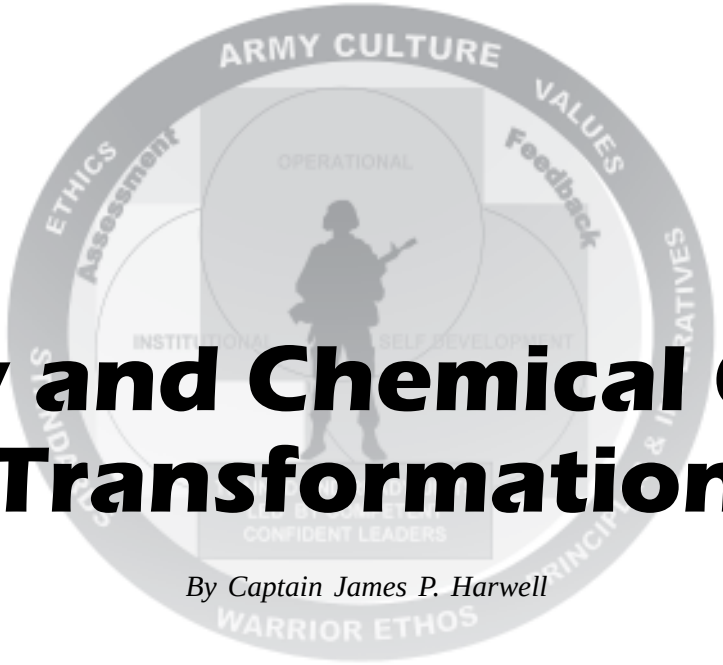
The Chemical Corps Vision

- An Army superbly equipped, trained, and ready to fight and win, ***unhindered*** by threatened or actual CBRN hazards.
- A Corps of professional Soldiers, tactically and technically unsurpassed, imbued with the ***warrior scientist/technician ethos***.
- A capability, both ***vital and relevant***, for the combatant commander, the joint warfight, and the ***defense of the homeland***.

("Regimental Command Sergeant Major" continued from page 3)

hazardous-material training—in the classroom and with hands-on experience—to expose all chemical Soldiers to operational procedures and consequence management. This has been a long time coming!

The bottom line is this: All Dragon Soldiers need to take every opportunity to educate themselves and stay educated on new equipment being fielded and new doctrine being developed as we become more "purple" (Joint Service) in the way we do business. Just because you are in a smoke platoon or at a brigade headquarters now does not mean that you do not need to know about decontamination or biological detection. Keep driving forward. The greater the knowledge base, the better asset you will be to your commanders.



Army and Chemical Corps Transformation

By Captain James P. Harwell

During peacetime, change within the Army is generally slow and deliberate—conducted at a pace supported by limited resources. In wartime, however, change must occur more rapidly. Operational forces must be quickly strengthened, and the best available resources must be promptly provided to deployed Soldiers. Thus, in response to contemporary strategic challenges, the Army has accelerated its transformation. This transformation not only serves as an end in itself, but it also contributes to the accomplishment of current missions. To drastically improve its ability to provide forces and capabilities to combatant commanders, the Army is now undergoing its most profound restructuring in more than fifty years. Key aspects of the transformation already affecting the current force include the following:

- Resetting, restructuring, rebalancing, and stabilizing the force.
- Integrating component technologies of future combat systems.
- Developing networked information systems.
- Modernizing institutional Army processes.

While commanding the US Army Training and Doctrine Command (TRADOC) in 1989, General Carl Vuono introduced what would become known as the "six imperatives" that would drive future change in the Army force structure. The imperatives—doctrine, organization, training, leader development, materiel, and Soldiers (DOTLMS)—were intended to provide a comprehensive means of determining requirements for broadly defined, emerging missions. Later, as the Army and joint forces became interoperable, DOTLMS evolved into doctrine, organization, training, materiel, leader education, personnel, and facilities (DOTMLPF) and was applied to all components of the joint force.

A revised version of Field Manual (FM) 1, *The Army*, was signed by General Peter Schoomaker, Chief of Staff of the Army, in June 2005.[1] This strategic document explains how the Army is currently postured to protect the Nation's interests and describes the plan for Army transformation. As such, FM 1 guides combat development across the force, ensuring that the evolution of force structure and capabilities supports US strategic requirements.

Because technology and the wartime environment are changing at an ever-increasing pace, combat developers must apply the DOTMLPF imperatives to fluid operational situations and seek countermeasures to emerging threats—countermeasures ranging from the use of new tactics, techniques, and procedures (TTP) to the creation of new units with specialized missions. The Chemical Corps has been a proponent for many initiatives that have supported both the traditional warfighter mission and the homeland defense/civil support mission. As chemical, biological, radiological, and nuclear (CBRN) technology becomes available to nontraditional opposing forces, chemical combat developers must identify emerging trends and develop countermeasures to reduce the threat to US personnel who are forward-deployed throughout the world.

Doctrine

Since Operation Desert Storm, most of the Army's conflicts have been fought across nonlinear battlefields—from Operation Restore Hope in Somalia to the North Atlantic Treaty Organization (NATO) Implementation Force (IFOR) and Stabilization Force (SFOR) missions in the Balkans—and bear some resemblance to today's operations in Southwest Asia. As the traditional, linear battlefield has evolved toward the asymmetric battlefield of today's contemporary operational environment, the doctrine, techniques, tactics, and procedures (DTTP) of the Chemical Corps have not changed rapidly enough to maintain relevance to the maneuver commander. This has been due more to the lack of a clearly defined system for debriefing key leaders as they redeploy from various theaters of operation than to combat developers who, from their posts in the chemical schoolhouse, readily extrapolate lessons learned from after-action reviews and incorporate them into current Officer Education System (OES) and Noncommissioned Officer Education System (NCOES) programs of instruction (POIs).

The chemical mission is often carried out at the platoon and company levels, as units are now assigned to both the traditional force structure, from battalion task force to brigade combat team, and as components of modular maneuver enhancement packages supporting units of action. Through discussions with company grade officers and enlisted personnel who spearhead the conduct of nontraditional missions, the Corps must ensure that the TTP are relevant and that small unit leaders are made aware of them in a timely manner.

In this age of information technology, there are tools which could allow for the rapid sharing of information across the force. The nonsecure internet protocol router network (NIPRNET) and the secret internet protocol router network (SIPRNET) provide 24-hour access to chemical personnel serving around the world. Many attempts have been made to develop a medium for information sharing, from the advent of the original chemical doctrine network almost a decade ago to the knowledge centers located on the Army Knowledge Online (AKO) Web site. Non-chemical-specific sites, such as <*http://companycommand.com*> and <*http://www.squadleader.com*>, have expanded upon these tools. The sites allow leaders to bridge the branch gap to share combined arms or branch-immaterial information. While all these sites provide the ability to share current TTP, the lack of a central, combat development Web site forces leaders to sift through a convoluted network to find information focused on specific types of organizations and missions.

Due to the lack of a single, unified communication network, coupled with the minimal attention paid to the CBRN mission by many combat arms counterparts, it is unclear who is shaping the TTP and future doctrine of the Corps and how the CBRN mission will be incorporated into the maneuver enhancement mission. While the force looks to TRADOC and other elements above Corps level for doctrine that defines how the Army and the Nation will fight future wars, the Chemical Corps must analyze potential future threats and determine the TTP and materiel countermeasures needed to defeat those threats. It is the technical expertise and ingenuity of the Corps Soldiers and junior leaders that will determine the most effective TTP for the conduct of small unit missions. However, the Corps can assist these Soldiers and junior leaders by integrating with organizations that have been tasked to seek out and defeat future threats **before** those threats can be used against forward-deployed forces. Lessons learned from key leaders, coupled with on-site analyses provided by deployed teams from units such as the Improvised Explosive Device (IED) Task Force and the recently announced Asymmetric Warfare Group (AWG), provide the basis for predicting emerging threats.

"Doctrine facilitates communication among Soldiers, contributes to a shared professional culture, and serves as the basis for curricula in the Army education system. The Army is a learning organization. It has evolved with the Nation through societal changes, technological advancements, and ever changing international circumstances. It continually revises its doctrine to account for changes, incorporating new technologies and lessons from operations. It improves education and training processes to provide Soldiers with the most challenging and realistic experience possible. It aims to impart to Soldiers and units the individual and collective skills, knowledge, and attributes required to accomplish their missions."

—FM 1

Organization

Not since the shift from the regimental combat teams of World War II to the divisional structure of today's legacy force has the Army seen such a drastic change in the organizations employed to fight the Nation's wars. This change has been motivated by a need for modular forces which can adapt to a variety of missions based on a combatant commander's request. Missions have traditionally been tasked to divisional headquarters, which requires that divisional troops support brigade combat teams conducting combined arms operations and further requires corps and theater level logistics support assets to

conduct sustainment operations. Lately, there has been a shift to brigade level units of action. Many of the capabilities previously found only in division and corps support commands are now available as organic capabilities in the brigade combat team force structure. These brigade level units of action are capable of self-sustainment, so they may operate independently or be attached to a unit of employment (UEx/UEy) headquarters.

The force structure of the Chemical Corps has traditionally existed among the divisional troops and echelons above division (EAD) support assets. Forces have been attached to brigade combat teams for operational deployments. This modular force structure is consistent with today's model for Army transformation. Relationships previously formed during contingency operations have solidified as reconnaissance and decontamination platoons have become organic components of the unit-of-action force structure. More robust, full-spectrum chemical capabilities have been integrated into the newly designed maneuver enhancement brigades, providing a natural wartime headquarters and more realistic combined arms training opportunities at the home station. The expansion of technically specific missions has forced the Corps to develop units with more robust combat capabilities. Current initiatives have led to the transformation of single-purpose reconnaissance, decontamination, and biological surveillance units to the modular design found in combat support (CS) and corps support (heavy) units, which provide all the enduring combat capabilities under a single headquarters.[2] Additionally, the integration of toxic industrial chemical (TIC)/toxic industrial material (TIM) response packages (once found only in technical escort units) into decontamination platoons will ensure that junior leaders can respond to a wide variety of missions that units may face.

"The operational Army provides essential landpower capabilities to combatant commanders. For most of the twentieth century, the operational Army was organized around the division. Field armies and corps were groups of divisions and supporting organizations. Brigades, regiments, and battalions were divisional components. This structure served the Army and the Nation well. However, to remain relevant and ready, the operational Army is transforming from a division-based to a brigade-based force. This more agile "modular force" is organized and trained to fight as part of the joint force. Modular organizations can be quickly assembled into strategically responsive force packages able to rapidly move wherever needed. They can quickly and seamlessly transition among types of operations better than could their predecessors. Modular organizations provide the bulk of forces needed for sustained land operations in the twenty-first century. In addition to conventional modular forces, the Army will continue to provide the major special operations force capabilities (both land and air) in support of the US Special Operations Command's global mission."

—FM 1

The most resource-intensive component of the CBRN mission is decontamination, as units attempt to restore combat power and reduce the stress of operations within a CBRN environment. Operational control requirements define the support relationship between the decontamination platoon and the supported unit. Heavy decontamination platoons currently rely on supported units for nearly half the manpower required to conduct detailed equipment decontamination missions. However, as training has demonstrated, supported units are often unprepared to provide augmentation beyond the requirement to conduct detailed troop decontamination. The hot, harsh climates of tropical and desert environments, like that of Southwest Asia, can make such augmentation even more difficult. And the problem can be further exacerbated by resource requirements for conducting the decontamination mission—most notably, water requirements. Although nonaqueous decontamination materials have been used to reduce aqueous resource requirements, platoons have not been organized to sustain decontamination support. The small manpower footprint of decontamination platoons and the failure of units to provide augmentation result in difficulty with managing work and rest cycles during sustained missions. If mismanaged, personnel losses can result.

While the concepts supporting the new force structure design are valid, the redesign of chemical units must be comprehensive. Current changes have resulted in restructuring (but not in redesign) below the company level. Minor flaws, which are only identified following the implementation of modified table of organization and equipment (MTOE) changes, are slow to be corrected. Comprehensive redesign, including a complete requirements analysis and the staffing of recommended changes to current field units, would result in fewer additional changes to MTOEs due to current missions and would allow combat developers to concentrate only on those changes necessary to address emerging threats and changing technological capabilities. This would allow the Army and the Chemical Corps to complete the redesign more quickly.

The Chemical Corps has taken initial steps to correct deficiencies and ensure the relevance of the chemical force structure in supporting maneuver commanders. However, because of low-density capabilities, more robust organizations are needed to provide support until materiel or other means are available to reduce involvement in personnel-intensive missions.

"Army forces train every day. After the War of 1812, Secretary of War John C. Calhoun articulated the sole purpose of a peacetime army—to prepare for war. But in today's security environment, the Nation is engaged in a protracted war—the War on Terrorism. The Army no longer considers itself a peacetime army preparing for war. Today peace is the exception. Deployments, including combat operations, are normal. To prepare Soldiers and units to operate in this new strategic context, the Army is training them for ongoing operations and preparing for other possible contingencies simultaneously."

—FM 1

Training

The evolution of the battlefield from a peer state, linear configuration to the current insurgent-focused, asymmetric battlefield requires that leaders and Soldiers be trained for the certainties of combat and educated in the many possibilities of war. Currently, the Nation is engaged in regional conflicts in Iraq and Afghanistan, but remains prepared to battle peer competitors. In order to fight the disorganized, dangerous terrorists of al-Qaida and still remain strong enough to battle the future threat of nations attempting to usurp the United States' hegemony, the Army and the joint force must undergo significant transformation. Today's Soldiers must be trained to fight enemies who hide in the shadows and conditioned to face the perils of traditional warfare. They must be inculcated with the Warrior Ethos, so that when enemies strike, they quickly learn that the United States will not be content to take a defensive position, but will seize the offensive.

Based on the Army Training and Leader Development Model, there are three pillars that shape critical learning experiences throughout Soldiers' and leaders' careers—institutional education, operational experience, and self-development. According to FM 7-0, *Training the Force*, "The model identifies an important interaction that trains Soldiers now and develops leaders for the future. Leader Development is a lifelong learning process."[3]

The institutional domain provides Soldiers and leaders with the basic skills needed to establish a foundation for future growth and development. However, institutional learning comprises only a small component of a Soldier's career development. Although the Chief of Chemical has supported the accession of "warrior scientists" to fill the ranks of chemical officers and NCOs, leaders have limited time to develop the science-based skills required to support the force. Additionally, there are no current opportunities for senior leaders who have completed formal, chemical-specific training, such as the Chemical Captain's Career Course (CMC3) and the Advanced Noncommissioned Officer's Course (ANCOC), to obtain additional instruction. However, the changing operational environment requires that leaders remain aware of new capabilities and understand evolving DTTP. This means that even leaders with science backgrounds must maintain strong ties to the chemical schoolhouse. Furthermore, while more and more battalion staff officer and NCO positions are being filled by inexperienced personnel who need institutional training, fewer of the OES and NCOES POIs are dedicated to CBRN-specific training; more emphasis is being placed on emerging threats unrelated to the chemical mission. While non-chemical-specific training enhances the ability to support maneuver operations, it jeopardizes the proficiency of chemical personnel in the areas of CBRN mitigation and protection. Chemical leadership must ensure that chemical skills continue to be trained as new POIs are integrated. In addition, instructional programs that continue the institutional education of chemical officers and NCOs beyond CMC3 and ANCOC must also be developed.

Operational experience is another important domain of professional development. Due to the current operational tempo, today's leaders have developed the most extensive operational experience base seen since the Vietnam War era. As new threats have emerged, leaders and Soldiers have been required to use innovation and mental agility to quickly adapt to the evolving battlefield environment and to prepare for the conduct of nontraditional missions. Chemical Soldiers, for example, have conducted missions ranging from port operations to convoy security. While the experiences of war have trained many Soldiers regarding the conduct of battle, leaders must also seek to instill subordinates with the "warrior spirit"—a desire to defeat the enemy, rather than to simply survive. Soldiers must be reminded that the primary responsibility of the Nation's Army is to defeat the enemy by destroying its ability to conduct war.

Prior to the restationing of the 23d Chemical Battalion from Korea to Fort Lewis, Washington, the unit mission consisted primarily of aerial port of debarkation (APOD) and sea port of debarkation (SPOD) support. However, faced with the potential for deployment to Iraq and Afghanistan, the unit placed greater emphasis on the force protection mission. To prepare for this mission, the unit focused on completing combat survivability and resupply patrol tasks and training in weapons proficiency and mastery. These tasks and training opportunities developed the basic skills necessary for the unit to conduct combat survivability missions in any major theater of operations.

The component of the Army Training and Leader Development Model which truly defines the professional Soldier is self-development. This includes reviewing after-action reports to determine the emergence of trends, maintaining a constant connection to proponents for doctrine development, and reading professional maneuver and skill-specific materials. Self-development comprises the largest portion of the model. Leaders must assume responsibility for their own development and continually strive to develop skills that will enable them to identify and formulate countermeasures to emerging threats. Mentors must actively motivate young leaders to develop the skills necessary to adapt to the contemporary operational environment.

Based on tasks outlined in resources such as the Combined Arms Training Strategy (CATS) and mission training plans (MTPs), leaders develop scenarios designed to ensure that Soldiers are able to apply knowledge gained through institutional education and self-development to operational experiences under controlled conditions. Soldiers must be confident that they and their leadership have the combat survivability skills necessary to sustain operations in wartime. This level of confidence is best developed through the realistic simulation of combat conditions in which the thought processes of Soldiers and leaders are stretched and the Warrior Ethos is ingrained in every Soldier.

Materiel

As the Army has moved to develop greater expeditionary capabilities, the materiel means to increase force survivability and lethality have become available. The fielding of component technologies of the land warrior and future combat systems has been streamlined so that the components are now available to operational units. These components have already been issued to all forces entering either of the two current major combat theaters of operations. Intermediate capabilities, such as those of the Stryker variant combat system, provide the means to support the transition from the *legacy force* to the *Army after next*. The fielding of digital battlefield network capabilities has been expanded, providing all operational units with capabilities once reserved for the digital divisions. Systems such as Force XXI battle command–brigade and below (FBCB2) and Blue Force Tracker have increased situational awareness, reducing battlefield fratricide and increasing the survivability of CS and combat service support (CSS) units, which have traditionally been considered "soft" targets. The use of commercial, off-the-shelf (COTS) capabilities, such as global positioning systems (GPSs) and two-way radios, has allowed units to overcome shortages of MTOE equipment. The flexibility to analyze materiel capabilities and rapidly purchase equipment represents a shift from previous policies in which Department of the Army (DA) or major command (MACOM) approval was required for the fielding of equipment. This newfound authority better enables individual units to overcome insurgent threats.

The Chemical Corps has long been active in the development of materiel means for defense against CBRN threats. From their role in supporting the US Army Soldier and Biological Chemical Command (SBCCOM) to the newly reorganized Research, Development, and Engineering Command (RDECOM) and Program Manager for Nuclear, Biological, and Chemical Defense (PM NBC), chemical officers have assisted the warfighter in developing new technologies designed to enable the force to survive on the CBRN battlefield. Recent initiatives include the development of the nuclear, biological, and chemical reconnaissance vehicle (NBCRV)—a Stryker variant reconnaissance system with a biological detection capability previously found only in the Biological Integrated Detection System (BIDS). The Chemical Corps has also supported the development of initiatives designed to take advantage of current tactical network capabilities and to integrate sensors into future tactical networks. This provides a clearer picture of the battlefield environment and allows the Corps to more efficiently carry out the low-density mission to advise maneuver commanders.

Although materiel means are now more readily available to the combat force, such means do not provide immediate answers to emerging threats. Therefore, as combat developers search for materiel solutions to the evolving battlefield threat, units must focus on developing TTP which increase the lethality and survivability of forces. Specialized organizations, such as the IED task force and the Defense Threat Reduction Agency, work with units to help develop the

> *"The operational Army is benefiting from future combat system programs today. The Army is integrating component technologies into the current force as they become available. It is not waiting until all future combat system elements are completely developed. This strategy allows the operational force to use the best equipment and latest technological enhancements available. In addition, the experience gained in using these technologies is helping improve future force decisions. A continuous cycle of innovation, experimentation, experience, and change is improving the Army's ability to provide dominant and sustained landpower to combatant commanders. It is getting newly developed technology to Soldiers faster then (sic) previously envisioned."*
>
> *—FM 1*

"Today's security environment demands more from Army leaders than ever before. Army leaders must not only be able to lead Soldiers but also influence other people. They must be able to work with members of other Services and governmental agencies. They must win the willing cooperation of multinational partners, both military and civilian. But ultimately, the Army demands self-aware and adaptive leaders who can compel enemies to surrender in war and master the circumstances facing them in peace. Victory and success depend on the effectiveness of these leaders' organizations. Developing effective organizations requires hard, realistic, and relevant training."

—FM 1

necessary TTP. Unit leaders are and will remain responsible for the development of force protection measures.

Leader Education

Today's leaders face the challenge of transformation in an Army that is engaged in a new type of war—one in which the enemy is not defined by nationalistic allegiance but by contempt for Western ideals. This type of operational environment provides unique challenges and experiences that recent generations of leaders did not face. The operational tempo associated with this type of environment strains the ability of units to train for missions beyond those that are theater-specific. However, leaders must prepare Soldiers for conducting high-intensity conflict operations, while also remaining ready for regional conflicts.

Leaders must analyze current doctrine and TTP to ensure their relevance. They must also have the mental agility to apply basic principles to complex problems. Senior leaders must continue to expand their knowledge base and assist junior leaders in developing the skills needed to perform in an evolving battlefield environment. Junior leaders must be willing to challenge old ideas and apply unique solutions to previously unforeseen problems. Leaders today, more than ever, must also understand the roles of their units as components of the joint force. The ability to integrate multiservice capabilities in support of nontraditional missions is an expectation traditionally reserved for senior officers and NCOs. However, all of today's leaders—including those providing CS and CSS—must understand the application of maneuver in complex environments.

The Chemical Corps has a reputation for developing adaptive, agile leaders who have a strong understanding of maneuver concepts. The integration of chemical personnel into the maneuver force structure provides the force with leaders who have a good understanding of traditional support and maneuver requirements and are also capable of performing nontraditional missions. The chemical OES/NCOES supports the development of adaptive leaders through the instruction of a broad array of tactical subjects. Institutional instruction is reinforced through operational experience and self-development, creating a strong knowledge base among junior leaders.

Soldiers deserve great leadership! They deserve compassionate leaders who are dedicated to ensuring that they have the skills necessary to survive on today's battlefield. Successful leaders understand that placing Soldiers in realistic, stressful situations within a controlled training environment is necessary to develop the skills required to survive and ultimately win wars.

Many units have developed leader certification programs which require that unit leaders be knowledgeable in the capabilities and proficient in the employment of their elements. These programs are designed to develop esprit de corps and establish peer groups, facilitating dialogue among leaders. The 23d focuses on leader knowledge and proficiency with all organizational property in the unit. It encourages self-development of young leaders by promoting professional reading so that officers may become tactically and technically sound. Many units also award credit for operational experience (such as awarding spurs to cavalry troopers who deploy with a cavalry unit but do not complete a spur ride program).

Personnel

Transformation of the Army under wartime conditions has placed considerable strain on the most precious and perishable resource available—the people. Failure to provide responsive support for future conflicts will degrade the reputation and threaten the status of the Corps. Personnel is the most difficult combat system component to produce, maintain, and replace. Therefore, the management of personnel as a perishable resource has been a dominant component of Army transformation and has driven initiatives such as the life-cycle manning of units.

The greatest challenge of the current Global War on Terrorism (GWOT) is the division of personnel resources. Army maneuver forces have a shared tactical and strategic mission to close with and defeat the enemy on the battlefield, and the vast majority of the chemical force structure is designed to support this mission. The emphasis on

> *"Well-trained Soldiers are fundamental to realizing any improvements in technology, techniques, or strategy. It is Soldiers who use technology, execute techniques, and accomplish strategies. It is they who bear the hardships of combat, adapt to the demands of complex environments, and accomplish the mission. Their collective proficiency and willingness to undergo the brutal test of wills that is combat remains the ultimate test of Army forces."*
>
> *—FM 1*

contamination avoidance through chemical reconnaissance and passive countermeasures has resulted in the chemical force structure being overlooked beyond low-density positions within maneuver forces. The decontamination mission, which is a component of strategic defense operations, is considered necessary only when transitioning to offensive operations. However, as enemy resources and expertise in developing CBRN weapons increase, the threat will become more prevalent. This new threat will challenge the ability of the Army to protect even the most hardened positions. Therefore, the Chemical Corps must ensure that current CBRN equipment is maintained and that troops remain rapidly deployable to support tactical and civil forces worldwide.

Facilities

As transformation of the force continues, greater emphasis is placed on interoperability of the Army within the joint force. Additional facilities will provide the infrastructure necessary to support realistic, joint-force training. Key units have been identified for expansion and realignment. Traditional service support facilities will be placed under new, unified garrison commands. As commands continue to grow, leaders will have greater opportunities to conduct combined arms training, previously capable only under contingency conditions. The success of unit operations depends on the geographic proximity of base clusters. These base clusters will support the operational footprint of restationing and newly created units. The impact of these new facilities will be based on the specific support that they can provide to the units, such as runways and shipyards.

> *"At the strategic level, joint interdependence allows each Service to divest itself of redundant functions that another Service provides better. Doing this reduces unnecessary duplication of capabilities among the Services. It achieves greater efficiency in all areas of expertise. Interdependence allows the Army to focus on developing capabilities that only land forces can provide. Likewise, relying on the Army for land-related capabilities allows the other Services to achieve greater efficiencies in their respective domains."*
>
> *—FM 1*

Conclusion

Combat development under wartime conditions would be a difficult task at any point in the operational spectrum. Today, however, it must be accomplished as the battlefield landscape evolves and leaders continuously face the challenges of emerging threats. Combat developers must consider the demands of the asymmetric battlefield, while never losing sight of peer competitor threats. They apply the DOTMLPF imperatives to ensure that newly designed or redesigned units are capable of supporting current and future operations. In today's rapidly changing battlefield environment, it is critical that field commanders and experienced operators are active members of the combat development process. In this age of transformation, as new technologies result in the refinement of both doctrine and TTP, leaders must actively provide feedback to combat developers and, when facing emerging threats, conduct lateral coordination and planning to facilitate the development of countermeasures, which enhances both survivability and lethality. Units that do not adapt to the contemporary operational environment face the possibility of operational irrelevance. They also, ultimately, present soft targets to a dangerous enemy.

Endnotes

[1] FM 1, *The Army*, 14 June 2005.

[2]The 23d Chemical Battalion will transform its current decontamination chemical companies to the new modular force structure CS and corps support (heavy) chemical companies during fiscal years 2006 and 2007. The transformation will add CBRN reconnaissance and biological detection capabilities. Additionally, the integration of this new chemical force structure into the new maneuver enhancement brigade design will enhance the ability of chemical staffs to prevent marginalization of the CBRN mission.

[3]FM 7-0, *Training the Force*, 22 October 2002.

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CCRA Scholarship Program

The Chemical Corps Regimental Association (CCRA) Board of Directors is pleased to announce the CCRA Scholarship Program.[1] CCRA is a private organization supporting the Chemical Corps infrastructure (Soldiers and their families, units, and organizations), the history and lineage of the Corps, and the Corps Museum.

Eligibility

The CCRA Scholarship Program will award scholarships to children of CCRA members. The term "children" is defined: natural or legally adopted children, stepchildren, and legal wards. More than one family member may apply; however, all applicants must submit an application and supporting documentation.

Awards

The number of scholarships and dollar amounts awarded may vary from year to year.

Students must be enrolled or planning to enroll in a program of undergraduate study at an accredited college or university. All schools must be accredited by a regional or national accrediting agency recognized by the US Secretary of Education.

Application Procedures

Access the CCRA Web site at *<http://www.chemical-corps.org/programs/scholarship.htm>* to download the forms necessary to apply to the scholarship program. All applicants must—

- Meet all of the qualifications described above.
- Complete and sign the application.
- Obtain a recommendation from a teacher, a counselor, an advisor, or another school official.
- Secure a transcript (an unofficial transcript will be accepted) or a copy of their grades.
- Mail the completed, signed application, the recommendation, and a transcript or copy of their grades to:

  The CCRA Scholarship Program
  Scholarship Managers
  PO Box 2810
  Cherry Hill, NJ 08034

All application materials must be mailed together in one envelope and postmarked by **1 May 2006.**

All applicants will be notified by mail of their status on or about **1 June 2006.** The selected recipients must notify Scholarship Managers of award acceptance within thirty days of notification, or the award will be forfeited. Scholarship Managers will send the award checks to the colleges selected by the students on or about **1 July 2006.** The checks will be made payable to the colleges. Scholarships may be held for a reasonable period of time in the case of an approved leave of absence or a serious illness or injury that interrupts studies. Students must notify Scholarship Managers immediately if any of these circumstances or other unusual circumstances arise.

Program Disclosures

1. The CCRA reserves the right to change or discontinue this program without notice.
2. Award recipients must notify Scholarship Managers of award acceptance within thirty days of notification, or the award will be forfeited.
3. Applicants are responsible for returning the completed signed application, a current transcript or copy of their grades, and a recommendation to Scholarship Managers postmarked no later than **1 May 2006.**
4. Questions may be directed to Scholarship Managers by telephone (856) 573-9400 or e-mail *<scholarship managers@scholarshipmanagers.com>*.

Important Note

Contributions to the CCRA to support this program are welcome from corporations, individuals, and chapters under the rules and conditions established by the board of directors. Contributors will be identified in CCRA publications. The CCRA corporate contribution policy does not permit corporate or individual funds to be directed to any individual or region. This is strictly enforced to maintain the highest ethical standards for contributors and recipients.

The coordinators for the CCRA Scholarship Program are Ms. Heather Gunter and Ms. Bonita Lillie.

Footnote:
[1]All phases of the program are independently managed by Scholarship Managers©®™, which is a division of Career Opportunities Through Education, Inc. (Coté)©®™. Scholarship Managers is a national, nonprofit organization with extensive experience in the management of scholarship programs.

CCRA 2005 Writing Contest Winners

Congratulations to the winners of the 2005 Chemical Corps Regimental Association (CCRA) writing contest! The winning entries focused on implementing Army transformation in units, portraying chemical units and staffs in nontraditional roles, inculcating the Warrior Ethos in chemical Soldiers, and implementing the vision of the Chemical Corps.

The entries were judged on a 100-point scale, with up to 40 points awarded for writing clarity, 30 points for relevance to chemical Soldiers, 20 points for general accuracy, and 10 points for originality. In addition to the place titles, the winning authors were awarded monetary awards.

First place was awarded to First Lieutenant John Russell for his article entitled *The Chemical Corps in Action*: *Meeting the Challenges of the Contemporary Operational Environment*, second place was awarded to Captain Brian Kohler for his article entitled *Site Exploitation and the Chemical Corps' Future*, and third place was awarded to Mr. Al Mauroni for his article entitled *The Chemical Corps' Expanding Roles*.

The following articles, as published in *Army Chemical Review,* have been edited for concerns in security, grammar, and clarity.

The Chemical Corps in Action: Meeting the Challenges of the Contemporary Operational Environment

By First Lieutenant John T. Russell

After the attacks of 11 September 2001 and the insurgency in Iraq, the Chemical Corps had to adapt to the rapidly changing threats, hazards, and challenges posed by contemporary warfare. The legacy force of the Chemical Corps prepared for large-scale chemical and biological warfare during the Persian Gulf War in 1991. While well prepared for chemical and biological attacks by a large army of uniformed enemy, the legacy force needs to be transformed into a more adaptable, more deployable, and more independent force in order to support the Army's response to both conventional warfare and small-scale terrorist attacks. Brigadier General Stanley H. Lillie's vision for the Chemical Corps is for "the Army to have the capability to operate and function completely unhindered by a threatened or real CBRN environment. This ability will allow the combatant commander to deploy and use his forces at 100 percent efficiency. To achieve this level of proficiency, we must provide our fighting forces the training, equipment, and expertise they require."[1] In order to achieve this vision, the Chemical Corps must develop new equipment, training, and battlefield information systems to prepare for chemical, biological, radiological, and nuclear (CBRN) attacks in the contemporary operational environment.

In this new environment, the front lines of the Cold War and the Persian Gulf War no longer exist. Terrorists pick the time and place of attack, blending in with the local populace to avoid detection before the attack and to evade pursuit afterwards. All Soldiers are targets, especially lightly armed and armored combat support and combat service support units. New chemical Soldiers must learn practical deployment skills, Warrior Ethos, and problem-solving abilities to best advise their commanders on both industrial hazards and small-scale terrorist CBRN attacks. Lessons learned from the hunt for weapons of mass destruction (WMD) in Iraq point toward the need for a more adaptable and informed chemical staff and integrated chemical companies and technical escort units. In order to leverage these lessons learned, the Chemical Corps must develop new equipment, advanced training, and battlefield information systems to research CBRN and industrial hazards and decide how to respond to them.

In October 2003, 1st Battalion, 32d Infantry Regiment (1-32), 10th Mountain Division (Light Infantry) assumed the responsibility to guard a power plant and munitions factory. During their initial patrol of the munitions factory, Soldiers of 1-32 Infantry discovered a large vat filled with green, scum-covered water that had rusting barrels floating

Rusting barrels floating in fetid water at a munitions factory

on the surface. There, they also found a room filled with mortar shells and open tops lying on the ground. The Soldiers noted a vapor forming off the nearby mortar shells and observed that the shells were filled with a black resin. The Soldiers became immediately suspicious and requested chemical support.

As there was not a chemical unit available, the battalion chemical officer gathered the nuclear, biological, and chemical (NBC) NCOs from the line companies and conducted a chemical and radiological reconnaissance. The chemical Soldiers found negative results in the pool, on the barrels, and on the mortars. These are all good tests for specific CBRN agents. However, the negative results could not be used to identify the substances. The team was unable to determine if the mysterious barrels represented a hazard to Soldiers and the local populace or if they would be useful to enemy insurgents in attacks against coalition forces.

The lack of ability to identify these substances meant that the chemical staff could not provide the commander with enough hard information to determine priorities for the site. Was it more important to secure the site twenty four hours a day, seven days a week, or was it more important to conduct route clearance patrols? Could the site possibly provide hazardous materials to the enemy at this one of many questionable sites, or was it more important to secure the roads? The issue came down to how the commander wanted to use his limited combat power to best bring the fight to the enemy—and he should have had expert advice from the chemical staff to aid that assessment. Lacking any quantitative information, the chemical staff fell back on common sense and recommended to the commander that Soldiers should avoid that part of the munitions factory to avoid potential vapor hazards and that the thousands of live shells stored at the factory were probably more of a threat than the unfinished pieces.

The staff followed up with a request for Fox reconnaissance vehicle support. Unfortunately, no technical escort units were available to conduct a more detailed analysis of the munitions factory. A Fox reconnaissance team eventually checked for WMD, which also returned a negative result. The Fox team returned a second time after the Fox systems had been upgraded, and it was determined that the material in the shells was phosphorous, used for incendiary mortar rounds. The common sense approach turned out to be the right answer after all.

Although the Fox support was great when it arrived, the chemical Soldiers needed more information faster than the recon units could provide it. The Soldiers did not have the equipment, the training, or the information references to properly assess an industrial hazard. No one at the company, battalion, or brigade levels knew what to look for at the munitions plant. Theater-specific information, like how to tell the difference between a chemical artillery shell and a conventional artillery shell, was not available. Further, no one knew the specific details of how to tell the difference between a normal Iraqi munitions factory and a factory that produced chemical weapons. A quick reference sheet on munitions and on industrial sites would have gone a long way to assist the Soldiers in assessing industrial sites for potential hazards. Chemical staff and company NBC NCOs need the ability to perform quick assessments of industrial hazards when outside support is not available. Without any organic industrial equipment, training, or reference information, the chemical Soldiers could not provide reliable information to the commanders, who need the right answer at the right time, within hours instead of weeks.

A power plant

The legacy force of the Chemical Corps retained following the Persian Gulf War focused on providing large units, divisions, and brigades with the ability to operate in NBC-contaminated environments and the ability to decontaminate Soldiers and equipment. During the Persian Gulf War, the Chemical Corps prepared the Army to defend against missile and artillery attacks with biological and chemical weapons. The Army fielded Fox reconnaissance vehicles, XM21 remote-sensing, chemical-agent alarms (RSCAALs), and chemical-agent monitors (CAMs) to assist in the detection of nerve and blister agents.[2] The Army geared itself for large-scale chemical warfare. However, the contemporary operational environment of today's armed forces poses new challenges. Terrorist attacks may target industrial sites or, in the worst possible circumstances, use WMD to produce mass casualties.

Train yard at a power plant

Equipment must be changed to meet the new challenges posed by a post-11 September 2001 world and the contemporary operational environment. Today's Chemical Corps needs to develop portable field tools for chemical staffs and chemical units to provide reconnaissance support capable of identifying a full spectrum of hazards. Threats during the Cold War were generally known and well understood. The Army and the Chemical Corps developed equipment and capabilities to meet the specific challenges posed by the former Soviet Union. However, the uncertain battlefields of the contemporary operational environment require a more diagnostic approach. Industrial sites often are contaminated with toxic industrial chemicals (TICs) and toxic industrial materials (TIMs). In particular, industrial centers in third world countries may be vital to the surrounding community and yet still pose significant health risks to Soldiers.

Additionally, industrial sites may need to be assessed as potential terrorist targets. For example, a chlorine or ammonia factory would pose a significant hazard to Soldiers if tanks of chlorine or ammonia were damaged by a terrorist attack. Chemical Soldiers need the equipment and training to assess these hazards, and chemical units need the capability to respond to them. Equipment needs to be portable, durable, and functional in any contaminated environment. The Chemical Corps should try to change unit modified tables of organization and equipment (MTOEs) and emulate local fire departments, which often have better protective gear and more adaptable, commercially available equipment.

However, the Chemical Corps needs more than just new equipment to meet the challenges on today's battlefield. To meet the Chief of Chemical's vision for "highly qualified Soldiers who are also flexible enough to adapt to any situation in any operational environment," training needs to focus on warrior tasks, hazardous materials handling, and theater-specific details of NBC weapons. Chemical Soldiers need to be flexible thinkers with a can-do attitude and warrior focus. They have a unique specialty in the Army, and they must provide both chemical expertise and warfighter prowess. According to Field Manual (FM) 7-1, "All leaders must focus training on warfighting skills, and make that training the priority."[3] Emphasis in training must be on marksmanship, battle drills, and accomplishing unit missions while operating in a field environment. Training must challenge Soldiers to think on their feet and adapt to hostile situations.

Several strategies are available to achieve the dual goals of warfighter prowess and military occupational specialty (MOS) proficiency. Institutional training at the

Chemical School needs to teach baseline knowledge of hazardous-materials handling and industrial-site analysis to Soldiers. Institutional training should also teach Soldiers the fundamentals of NBC warfare, starting at the factory and ending with the chemical shell. Soldiers need to know what an NBC manufacturing facility looks like, the methods of weaponizing agents, the foreign methods of marking NBC weapons, and the difference between a conventional artillery shell and a chemical artillery shell. WMD are the specialty of the Chemical Corps, and Soldiers need a practical, hands-on approach to become subject matter experts for their units and to have the confidence to safely handle WMD in a real situation.

Outside the schoolhouse, chemical units and staff should maximize field time to build tactical skills, MOS proficiency, and Warrior Ethos at the same time. Field training exercises provide an increasingly important opportunity to leave the mental security of a familiar training environment and take on the challenge of confidently performing missions in uncertain terrain and austere conditions. Training needs to incorporate tactical discipline with MOS proficiency—from the convoy to the decontamination line. Exercises involving military operations in urban terrain provide great opportunities to combine tactical training and response to NBC, TIC, and TIM hazards. Field exercises prepare Soldiers for war and help them to develop Warrior Ethos. According to FM 7-1, "The Warrior Ethos forms the foundation for the American Soldier's spirit and total commitment to victory, in peace and war, always exemplifying ethical behavior and Army values." Warrior Ethos require Soldiers to be self-sufficient and ruggedly independent. The collective security of the unit is the individual responsibility of the Soldier, and every Soldier must be ready to do his or her part. FM 7-1 directs that "Soldiers put the mission first, refuse to accept defeat, never quit, and never leave behind a fellow American." The practical application of skills learned in a field training environment will make Soldiers and leaders confident in their abilities to perform wartime missions.

Army transformation focuses on changing to a more integrated, lighter, and more-deployable force with agility and great combat power. Part of the growth of Army transformation will be the spread of battlefield systems that will allow greater communication and greater operational independence within the commander's intent. The Chemical Corps needs systems to allow the decentralization of information down to the lowest levels. Chemical Soldiers need to be able to request, research, and receive information to best provide timely advice to the combatant commander. To this end, the Chemical Corps needs to be able to work together with civilian agencies like the Federal Emergency Management Agency (FEMA) and the Environmental Protection Agency (EPA) to quickly identify battlefield hazards, assess risks to Soldiers, and provide timely recommendations. Chemical Soldiers need theater-specific intelligence to inform commanders. A network of resources should be available to inform a chemical Soldier. A stateside team based at the Chemical School that could answer questions for deployed chemical staff or provide points of contact for experts in other agencies would provide an outstanding reference asset to the Chemical Corps. Fundamentally, the chemical Soldier needs all the research and support assets that a modern fire department has. Response techniques and procedures can be used from the civilian perspective to develop tactics, techniques, and procedures for chemical companies. Information will be the commodity of the future for the Chemical Corps.

The intersection of Warrior Ethos, Army transformation, nonstandard missions for chemical staff and units, and the Chemical Corps vision are a nexus for highly trained, combat-ready Soldiers; diagnostic equipment that provides up-to-the-minute analysis; and information systems to process data and provide guidance for appropriate response. The Chemical Corps must develop new equipment, training, and battlefield information systems to meet the threats posed by terrorism and WMD in the contemporary operational environment. With the right tools and the right training, chemical Soldiers will be ready for any situation and operational environment, proud to serve their country as a mission-essential branch of the United States Army.

References

[1]Stanley H. Lillie, Chief of Chemical, "The Chemical Corps Vision," *<http://www.wood.army.mil/usacmls/usacmlsflash/flashindex.html>*, access date unknown.

[2]Albert J. Mauroni, *Chemical-Biological Defense*, Praeger Publishers, 30 August 1999.

[3]FM 7-1, *Battle Focused Training*, 15 September 2003.

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Site Exploitation and the Chemical Corps' Future

By Captain Brian S. Kohler

The perceived relevance of the Chemical Corps continues to decline as more conflicts are fought without encountering significant chemical, biological, radiological, and nuclear (CBRN) threats on the battlefield. The threat of a large-scale CBRN attack seems to dwindle as the Global War on Terrorism (GWOT) continues. The decontamination units and heavy nuclear, biological, and chemical (NBC) reconnaissance vehicles designed for the Cold War are often seen as irrelevant to today's threat and are frequently misused.

This article provides recommendations on how to maintain the relevance of the Chemical Corps and includes viable missions that support today's combat missions. The Chemical Corps should be trained to provide quality forensic intelligence and evidence collection through site exploitation. They should augment combat units on all missions in order to properly collect, handle, and transfer intelligence and evidence information.

There are multiple topics that support a shift to these types of missions. First, I will lay out the case for these changes by discussing the current situation of our military, specifically in Iraq and Afghanistan. Second, I will discuss the current capabilities of the Chemical Corps and suggest supplementary capabilities. Next, I will identify the resources required to meet the added capabilities suggested. Finally, I will detail the advantages of these additional capabilities. The information provided will make it clear that this capability is definitely needed and that the Chemical Corps is in a position to execute these crucial missions.

Background of Current Situation

The number of stability operations conducted by the United States continues to grow. All units in the Army are almost expected to perform as "police." Many raids and cordon-and-search missions result in multiple persons under control (PUCs). Much of the evidence that could be used to gain intelligence information and incarcerate many of these PUCs is either improperly collected or not collected at all. The majority of the evidence that is collected properly is inadmissible during tribunals because there are no good chain-of-custody procedures. Many individuals—dangerous threats to national security—have been released to their homelands due to lack of admissible evidence.

Evidence collection and handling must be improved. US and allied forces have captured hundreds of al-Qaida terrorists and enemy combatants throughout Iraq and Afghanistan. Tribunals have already begun on many of these enemies. The defense counsels for these combatants have chosen to concentrate on discrediting the evidence presented against their clients. The evidence and intelligence gathered on the majority of these terrorists was gathered in the midst of battle. The Soldier gathering the evidence was likely tasked while at the target and was probably not trained on collecting or handling evidence. There was no distinguishable chain of custody, no photographs or video, and no documentation to verify that the evidence presented was even related to the terrorist on trial. Judges have refused to admit critical evidence and intelligence due to the lack of discernible chain-of-custody procedures.

Many detainees have been released and continue to threaten the United States and its allies. Others have been released and captured again. The military has attempted to solve this problem by providing criminal investigation support from the Military Police (MP) Criminal Investigation Command (CID). These agents are specifically trained in forensic evidence, but they are few and far between. The CID agents are usually only available to assist with high-visibility raids. The Chemical Corps would be able to augment this capability on a much larger scale. Each maneuver commander would have his own exploitation force.

The other issue plaguing forces in Iraq and Afghanistan is the inability to obtain actionable intelligence. Interrogators face numerous restrictions on the techniques they can use due to claims of abuse. The interrogators need information that they can use to manipulate the detainees

into providing additional intelligence. This information can take the form of documents, photographs, or technical and tactical equipment. Most Soldiers are not trained on how to spot these bits of intelligence, and fewer are able to properly collect and handle it.

Current Chemical Corps Capabilities

The Chemical Corps is currently developing training to support site exploitation operations. Site exploitation is identical to processing a crime scene, only it occurs on the battlefield. The Chemical Corps has several subject matter experts with substantial experience in exploiting suspected CBRN facilities. There are leaders throughout the Chemical Corps that have implemented the strictest chains of custody while transporting alleged and actual CBRN materials.

Exploitation specialists are trained to process a site with a fine-tooth comb. They know what to look for, what to photograph and how to photograph it, and what proper video recording techniques are required. They are trained to document the seizure of the materials and ensure that the context of the collection is well documented. These specialists ensure that the chain of custody is maintained and that the data, equipment, or documents are properly transferred to the appropriate places.

Chemical Soldiers not trained in exploitation still possess many of these skills. Sampling techniques, chain-of-custody, and reconnaissance techniques are taught at chemical courses such as NBC Reconnaissance (L5) and Technical Escort (J5). These skills can be easily adapted to search a secure site and exploit intelligence or evidence of criminal activity or other acts that threaten the United States and its allies. Once evacuated from the site, this material will be properly safeguarded, transported, and recorded by well-trained chemical Soldiers. The chain of custody remains intact, and the intelligence and evidence is credible and admissible.

Chemical Soldiers are also trained and equipped with various CBRN sampling kits. These kits can be used to take quality forensic-evidence samples using the same tactics, techniques, and procedures (TTP) used for CBRN sampling. The fundamentals of sample contamination avoidance, proper packaging, transport, and chain of custody still apply to forensic-evidence collection.

Site exploitation and forensic-evidence collection depend on the thorough collection of technical intelligence (TECHINT) and measurement and signature intelligence (MASINT). Joint Publication (JP) 1-02 defines MASINT as the "scientific and technical intelligence information obtained by quantitative and qualitative analysis of data (metric, angle, spatial, wavelength, time dependence, modulation, plasma, and hydromagnetic) derived from specific technical sensors for the purpose of identifying any distinctive features associated with the target, source, emitter, or sender measurement of the same."[1] Training involving CBRN detection and identification provides chemical Soldiers with a firm foundation to address more sophisticated MASINT requirements for site exploitation. JP 1-02 defines TECHINT as "intelligence derived from exploitation of foreign material, produced for strategic, operational, and tactical level commanders."[2] Chemical Soldiers have an advantage when learning TECHINT collection and analysis due to the highly technical aspects of their military occupational specialties (MOSs).

Resources Required for Additional Capability

The majority of the resources required for the Chemical Corps to meet the requirements of a forensic-collection capability are minimal. There are training and equipment requirements, but the courses and equipment are already in the military inventory; they are not abstract concepts that need to be developed. The doctrine and TTP also exist in multiple documents. These documents simply need to be merged into a conglomerate manual.

Site exploitation is only a collateral activity, not a mission for most chemical units. There are only a few detachments (Special Forces, technical escort units, and civil support teams) that specialize in this activity, but their experience is immense and easily shared. The Chemical Corps can easily draw this experience into their training regimen and make site exploitation a mission-essential task for conventional chemical units. This would fill the void in this crucial task.

The US Army Chemical School is colocated with the US Army MP School. The Criminal Investigation Course is taught by the MP School. The Chemical School can easily revise the MP program of instruction (POI) to meet the needs of the Chemical Corps. The POI would need to cover several subjects. Soldiers must learn how to enter a site and how to deliberately search that site for important information and evidence. The Soldiers must have a complex understanding of explosives, munitions, and scientific equipment. They must be trained on the proper collection techniques for forensic evidence, to include

fingerprinting, DNA samples, gunshot residue (GSR) samples, explosives swipe samples, and shell casings. The more senior chemical personnel must be trained in how to analyze this data. Additionally, the Soldiers will need training on chain-of-custody procedures. Finally, Soldiers will need advanced training in marksmanship, small-unit tactics, close-quarter battles, and combatives since they will be conducting direct action raids with assault forces.

The additional equipment required for the Chemical Corps to add new capabilities is negligible. The sampling kits that are currently used for CBRN sampling can be tweaked to meet the needs of forensic sampling (this will change depending on the environment and the threat). These kits can also add tweezers, swabs, bags, seals, ink, and paper for DNA testing and fingerprinting. Handheld retinal scanners are also available, allowing for the creation of a biometric database of suspected enemy personnel.

Explosives detection can be added to chemical detection equipment to provide identification information on individuals that are experimenting with improvised explosive devices (IEDs). These devices are handheld and lightweight. The look and feel of the apparatus, as well as the TTP used to operate them, are almost identical to the improved chemical-agent monitor. These devices must only be used to detect the presence of explosive materials. The identification, render safe, and removal of IEDs must remain an explosive ordnance disposal (EOD) task.

GSR detection kits will be able to confirm if a person has recently fired a weapon. These kits are small and simple. The operator needs only to swipe the hands of a suspected combatant, spray the swipe with a compound, and read the resulting color. Positive swipes are documented and packaged as evidence.

Site exploitation specialists package a sample for extraction during a training exercise.

Recording and documenting gear is essential to proper collection techniques. Teams conducting site exploitation will need high-quality cameras (both still and video), as well as training on proper techniques. The chain-of-custody documents, inventory sheets, and other documentation are already in the military's inventory. Additionally, these teams may be equipped with special equipment for entry into hazardous areas. Chemical Soldiers are already trained to operate in hazardous environments such as confined spaces and chemically contaminated areas. This capability can be improved with detectors for explosive environments (lower explosive limit/higher explosive limit), oxygen detectors, and corrosives detectors. Supplied air systems, such as a self-contained breathing apparatus (SCBA), would allow entry into zones with depleted oxygen levels or areas contaminated by chemicals that may penetrate military protective masks.

The final resource requirement is integration into other government agencies, such as the Federal Bureau of Investigation and the Central Intelligence Agency. These organizations have access to databases that are vital to the analysis of the data collected.

Advantages of Added Capability

The advantages of the Chemical Corps developing these capabilities are too numerous and vital to ignore. As stated earlier, an added quality forensic-sampling resource will provide stronger evidence for tribunals against threats to national and global security. Less evidence will be labeled inadmissible, and more guilty parties will be incarcerated.

Chemical Soldiers will be able to collect expended shell casings from weapons fired at coalition forces. These casings can be put into a ballistics database. If a suspect is captured with a weapon that is known to have fired on coalition forces, this adds to the evidence against the suspect.

DNA sampling, fingerprinting, and retinal scanning will provide a definitive biometric database. There is currently much confusion with identifying PUCs. There are no reliable forms of identification on most persons captured in Iraq and Afghanistan. Witnesses are used to provide names, and the spellings often vary. It is nearly impossible to determine if a PUC has been captured in the past and released. The biometric database will resolve this issue.

An explosives detection capability will allow for more technical exploitations during cordon-and-search missions. It will identify persons involved in handling explosives, as well as persons that have recently fired weapons. The technology is inexpensive, reliable, and easy to use.

Finally, this capability will provide Soldiers trained in site exploitation and ready for almost every imaginable mission. These Soldiers will tear through a target quickly and pull all vital information, evidence, and intelligence. This information will be processed and will eventually lead to more actionable intelligence and the incarceration of national security threats.

Summary

It is evident that quality forensic sampling is a necessity on today's battlefield. It is clear that the Chemical Corps can meet this requirement with minor modifications to structure, personnel, training, and equipment. If the Chemical Corps pursues this capability, it will make us a viable combat multiplier on any battlefield, whether there are CBRN hazards or not.

References

[1]JP 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001 (As Amended Through 9 January 2003). The date of the current publication is "As Amended Through 31 August 2005."

[2]JP 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001 (As Amended Through 31 August 2005).

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Regimental Week Agenda

The Chemical Corps Regimental Week and the Joint CBRN Conference and Exhibition (formerly the Worldwide Chemical Conference) will be held at Fort Leonard Wood, Missouri, 25–29 June 2006. For more information and an up-to-date agenda, please visit the Chemical School's Web site <*http://www.wood.army.mil/usacmls/*>.

Time	Event	Location
Sunday, 25 June 2006		
0800–1700	Dragon's Peak	TBD
1700–1900	Colonels' Conference (Invitation Only)	Pershing Community Club
1900–2100	Social	Pershing Community Club
Monday, 26 June 2006		
0800–1130	Sergeants' Major Conference	Audie Murphy Club
0800–2330	Dragon's Peak	TBD
0800–1100	General Officers' Conference (Invitation Only)	Pershing Community Club
1200–1700	Regimental Golf Tournament	Piney Valley Golf Course
Tuesday, 27 June 2006		
0800–2330	Dragon's Peak	TBD
1830–1900	Regimental Review and Sibert Award Presentation	Gammon Field
2000–2200	HOF/DMC Reception (Invitation Only)	
Wednesday, 28 June 2006		
0530–0700	Regimental Run	Gammon Field
0800–1500	Dragon's Peak	TBD
1430–1615	HOF/DMC Induction	Abrams Theater
1730–1830	Cocktails	Davidson Fitness Center
1830–Complete	Green Dragon Ball	Davidson Fitness Center

The Chemical Corps' Expanding Roles

By Mr. Al Mauroni

The traditional Army chemical specialist strives to develop his or her unit capability to protect himself against an adversarial nation's use of nuclear, biological, and chemical (NBC) weapons on the battlefield. Up until about 2001, the majority of the Chemical Corps' energy—in terms of developing doctrine, organization, training, materiel, leader education, personnel, and facilities (DOTMLPF)—was focused on supporting traditional combat operations executed overseas. This practice has been ongoing since at least 1976, when the Chemical Corps took steps to become less of a technical organization and more of an operational organization. This measure was necessary to convince the Army that the Chemical Corps should not be disestablished, as the Chief of Staff of the Army, General Creighton Abrams, directed in 1972. Another nexus of change has recently come upon the Chemical Corps, but it is quiet and stealthy.

In 1995, Aum Shinrikyo's use of nerve agent in the Tokyo subway opened up a new mission area. Between 1998 and 2001, this event led to the creation of weapons of mass destruction–civil support teams (WMD-CSTs), formalizing civil support to state and local emergency responders responding to terrorist chemical, biological, radiological, and nuclear (CBRN) hazards. In the latter half of the 1990s, the mission of foreign consequence management—assisting coalition allies in responding to the effects of NBC weapons—was formalized and executed as a combatant command responsibility. In April 2002, the Office of the Secretary of Defense (OSD) directed the Chairman of the Joint Chiefs of Staff to develop standards, concepts of operation, and guidance to harden US military installations and Department of Defense (DOD)-owned or -leased facilities against the impact of terrorist CBRN incidents. This created the fourth new mission area—supporting antiterrorism programs executed on military installations.

There are two major schools of thought on how the Chemical Corps might approach this increase in mission scope. One points out that the common denominator in the four mission areas—passive defense, consequence management, antiterrorism, and civil support—is the general response to the threat of CBRN hazards. Therefore, the solution is to become technical experts in CBRN hazard analysis, where this general expertise can be applied to these distinct missions. The other road leads toward a transformation of the Chemical Corps to become more specialized, as opposed to generalized, in its execution of missions. I believe that future success lies in the ability to understand passive defense, consequence management, antiterrorism, and civil support as specialized fields and to apply specific CBRN defense capabilities for specific mission requirements.

Defining the Challenge

Following the Gulf War in 1991, DOD initiated a Defense Counterproliferation Initiative to create alternative solutions to challenging nonnuclear adversaries (armed with chemical and biological weapons) with US nuclear weapons. Prior to 1991, NBC defense was an aspect of deterring superpowers from using NBC weapons and protecting military forces in the event that deterrence failed. After 1993, the term *passive defense* was used to describe the role of NBC defense and became one of the four counterproliferation pillars (counterforce, active defense, passive defense, and consequence management). Current operations in Afghanistan and Iraq have not invalidated the need for passive-defense capabilities, but the absence of any NBC weapons employment has called into question the exact form of future capabilities. Defense Secretary Donald Rumsfeld has stressed that combating proliferation of WMD is a top defense priority, but passive defense remains only a small aspect of that priority. The OSD has also directed the Army to develop WMD elimination capabilities, while other agencies are developing WMD interdiction capabilities.

The term *consequence management*, under the counterproliferation strategy, addresses both the long-term remediation of contaminated terrain and military equipment to preincident conditions and support to coalition allies whose governments request official US military support to respond to the use of NBC weapons in their country. This is really foreign consequence management, as opposed to domestic consequence management. The Bush administration's National Strategy to Combat WMD splits consequence management out of the counterproliferation area to emphasize the need for domestic consequence

management (in addition to foreign consequence management). However, foreign consequence management requires unique coordination and execution responsibilities due to its overseas environment.

The former Federal Response Plan (replaced by the National Response Plan) had a special chapter that addressed the federal response to terrorist events, bringing the terms *crisis management* and *consequence management* into play for domestic terrorism. In 1998, the DOD Domestic Preparedness Program provided guidance to train more than 100 cities on responding to terrorist CBRN incidents before the Department of Justice took over (and subsequently, the Department of Homeland Security). Defense Secretary William Cohen initiated the development of WMD-CSTs (initially called *rapid-assistance and initial-detection [RAID] teams*) as part of an effort to build Reserve and National Guard capabilities that could join the federal support to assist state and local emergency responders. The Army's Technical Escort Unit and the Marine Corps' Chemical and Biological Incident Response Force also play roles in the federal support effort. What is now called *civil support* (or military assistance to civil authorities) requires unique equipment and concepts of operation very different from those supporting traditional military combat missions.

Following 11 September 2001, DOD took a hard look at increasing the ability of installations and facilities to protect their populations from and respond to terrorist CBRN incidents. The Installation Protection Program, now executed through the Joint Program Manager–Guardian, aims to add CBRN defense capabilities to the antiterrorism programs of military installations, starting with 15 US installations in Fiscal Year 2005. This is a more complex issue than merely emplacing a package of CBRN defense equipment on military installations. This capability must be maintained throughout the year, and the resources allocated for this mission are limited. The passive-defense concept, heavy in equipment and designed for relatively short periods of high threat, does not fit well in antiterrorism programs. This concept will force officials to make decisions on risk management to determine what mix of equipment, personnel, and concepts represents adequate protection for each individual facility and installation.

The increased desire for CBRN defense expertise outside the traditional area of military combat operations will mandate that the Chemical Corps be reexamined to ensure that today's capabilities match the expectations of DOD leadership. The DOD transformation agenda, in particular, calls for all armed forces to reevaluate their capabilities and balance their efforts against traditional, irregular, catastrophic, and disruptive threats. People within the Beltway are not asking for NBC or CBRN defense capabilities. What they are asking for are defense capabilities that support combating proliferation of WMD, homeland defense, civil support, and antiterrorism efforts at military installations and facilities.

Developing a New Framework

When the Joint Requirements Office (JRO) for CBRN Defense was stood up in 2003, the Vice Director of the Joint Chiefs of Staff chartered it to address all joint CBRN defense issues related to passive defense, consequence management, force protection, and homeland security. To do this, the JRO created a new definition for CBRN hazards:

> *Those toxic CBRN hazards that are released in the presence of US forces or civilians, not necessarily in quantities that could cause mass casualties. CBRN hazards include those created from a release other than an attack, toxic industrial chemicals (specifically toxic inhalation hazards), biological diseases with significant effects, and radioactive matter. Also included are any hazards resulting from the deliberate employment of NBC weapons during military operations.*

This definition identifies that not all CBRN incidents involve mass casualties, an important factor when addressing terrorist incidents, as opposed to national and state WMD programs. There is a difference between defending against the use of NBC weapons and responding to CBRN hazards, and the future force needs to take this into consideration. To build on this point, one can state that NBC defense and CBRN defense might have two different, but related definitions. To become more capability-based, one must not focus on the technical aspects of the threat but rather on the desired effect of CBRN defense in terms of a particular scenario. To support this point, the JRO has illustrated a diagram (see facing page) showing where CBRN defense would support counterproliferation, force protection, and homeland security efforts.

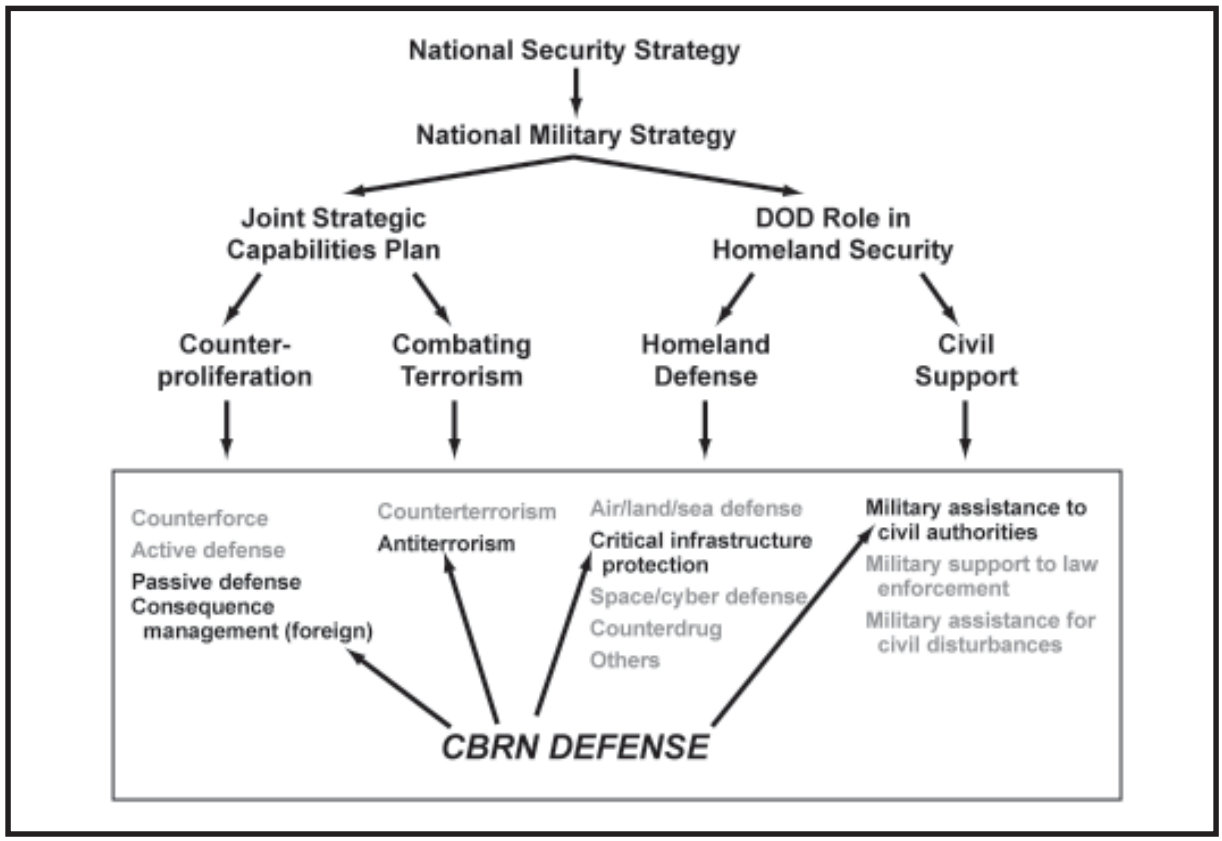
This structure illustrates how CBRN defense fits into the major defense capabilities being discussed. It shows how CBRN defense supports the execution of the commander's intent for a specific purpose. That is to say, we execute CBRN defense for military combat forces to

ensure that they can survive and sustain operations on the battlefield. We execute CBRN defense within antiterrorism programs to protect military and civilian personnel working and living on military installations. We execute CBRN defense in support of homeland defense by ensuring that critical infrastructure can sustain its capabilities through a terrorist CBRN incident. We execute CBRN defense as part of a federal response to state and local emergency responders that are protecting civilians from the effects of a terrorist CBRN incident.

Each case calls for a very specific set of tools, knowledge, and coordination within a greater construct. This is far different than what the Chemical Corps did for much of the 1980s and 1990s, when its efforts were largely restricted to military combat scenarios. We should not fall into the intellectual laziness of believing that "one size fits all." At the same time, the common threat of CBRN hazards calls for a common basis in subject matter expertise and technology but not necessarily the same equipment in all cases. In order for the Chemical Corps to meet future challenges, it must specialize in particular missions, as opposed to retaining a generalized capability that may not fit well with all four mission parameters.

Developing Capability-Based Concepts, Doctrine, Leaders, and Forces

Defense Secretary Rumsfeld approved the Joint Operations Concept in November 2003. Its purpose is to describe how military commanders will accomplish strategic objectives 10 to 20 years in the future. The document identifies four joint operating concepts—military combat operations (traditional warfighting against another nation), homeland security, strategic deterrence (actions taken to discourage aggression by potential adversaries), and stability operations (military operations during peacetime). There is a set of joint functional tools by which the commander executes his or her plans against these four operating concepts. These joint functional concepts include force application, protection, battlespace awareness, command and control, focused logistics, and net-centric operations. Everything that the military develops as a future capability is supposed to fall under one of these functional areas, with applications in major combat operations, strategic deterrence, stability operations, or homeland security. CBRN defense falls under the "protection" capability.



CBRN defense construct for the twenty-first century

The Joint Functional Capability Board has oversight on air and missile defense, maritime defense, WMD (combating incidences), force protection (combating terrorism), force health protection, critical infrastructure protection, information operations defense, and a collection of other minor areas. Each of the components under the protection functional capability is expected to illustrate a common set of characteristics that would be executed in any of the four joint operating concepts. This construct is explained in the Joint Requirements Oversight Council (JROC)-approved Protection Joint Functional Concept, dated 30 June 2004.

The JRO leadership recognized the opportunity to change the joint doctrine concept of contamination avoidance, protection, and restoration to a new CBRN defense concept (initiated by the Chemical School in 1999) called *sense, shape, shield, and sustain (the 4S concept)*. The 4S concept aligns with the Joint Functional Capability Board's activities of detect (sense), assess, warn (shape), defend (shield), and recover (sustain). Because the 4S concept loses the strict military combat connotation associated with the old terms, it is applicable (with some changes in the exact tactics, techniques, and procedures [TTP]) to antiterrorism, consequence management, and homeland defense. Identifying how CBRN defense fits within the Protection Joint Functional Concept and against the four joint operational concepts is the key to successfully transforming the Chemical Corps.

Army chemical units and personnel should also transform under this new concept. The infantry branch has been a proponent of specialization for some time, with its mechanized infantry, airborne and special operations infantry, light infantry, and "leg" infantry. Each section has particular units and doctrine designed for specific combat operations. The Chemical Corps could develop similar new specialties and specific organizations for unique CBRN defense applications. The current chemical company and battalion structure already meets the need for passive defense and foreign consequence management. Developing a specialty field to address CBRN defense in military installation antiterrorism programs might be possible through a special course of instruction, similar to how the Chemical Corps currently qualifies reconnaissance specialists. Homeland defense and civil support require dedicated military units and a joint task force structure that can coordinate with the US Northern Command and execute support to state and local authorities, such as those held by the 22d Operations Command.

We also need a dedicated laboratory specialist category and unit added to the force. If chemical specialists in the field are being called upon to evaluate hazardous industrial materials and to support WMD elimination operations, we need a dedicated, active-duty, deployable laboratory to do the work. The laboratory supporting the North Atlantic Treaty Organization (NATO) CBRN battalion is a successful example. And four deployable chemical-biological labs are to join the 22d Operations Command sometime in the future. These laboratories may require a high degree of technical expertise and sophisticated equipment, but their need is clearly felt. It is unrealistic to expect every chemical Soldier to be an analytical scientist.

We need to adjust and update joint doctrine to meet this new concept. The past focus on developing individual manuals for avoidance, protection, and restoration should shift to manuals addressing CBRN defense for combating proliferation, antiterrorism, and homeland defense. While we have a common 4S concept that applies to all mission areas, the particular TTP for each mission—as opposed to technical practices—needs to be laid out, debated, and finalized in line with the Joint Operations Concept.

Conclusion

The nature and form of current and future CBRN hazards have fundamentally changed from the previous threat of NBC weapons on the battlefield. To effectively respond to the future nature of the hazard, the Chemical Corps must transform itself to adapt to the nontraditional roles of combating terrorism and homeland security, in addition to combating proliferation. The successful method to effect this transformation is to specialize DOTMLPF to specific operational concepts. This is not the first time the Chemical Corps has had to transform to adapt to the military's ever-changing requirements, nor will it be the last. The ongoing defense transformation agenda offers a perfect opportunity for the Chemical Corps to demonstrate that it understands what the future demands and is prepared to address new joint operations concepts through specialized units and focused TTP.

Mr. Mauroni is a CBRN defense analyst with Innovative Emergency Management, Incorporated. He is a former chemical officer, with 19 years' experience in joint CBRN defense programs and policy. He is the author of four books and several articles on CBRN defense issues.

A Glimpse Into the Future:

The Artful Planning and Use of CBRN Information

By Mr. James M. (Mike) Cress

The Chemical Corps is on the verge of attaining new capabilities that are dramatically different from the capabilities of the past—especially in the area of contamination avoidance. These new capabilities are the result of recent advances, such as—

- Remote- and point-sensing payloads for unmanned aerial vehicles.
- Unmanned ground vehicles (robots).
- Projectable and drop-off sensors.
- Networked monitors built into vehicles or warfighter ensembles as functional components.
- Improved detection information obtained from unique, high-fidelity chemical, biological, radiological, and nuclear (CBRN) assets.

In addition to the dedicated, high-fidelity CBRN systems, a number of multi-mission-capable sensors provide CBRN event notification with varying degrees of reliability.

The goal of the Corps is an information management system that paints an accurate and timely picture of unfolding events so that future CBRN leaders can successfully advise commanders, denying the enemy mission-spoiling ability, and avoid the consequences associated with unwarned encounters with toxic agents. This challenge involves artfully planning, collecting, and using the information without sitting down at a desk and sifting through a cumbersome pile of nuclear, biological, and chemical (NBC) reports.

Field surveillance equipment may consist of remotely emplaced point devices that allow standoff detection capability over large areas within the field of view; they are typically used to monitor named areas of interest (NAIs). These types of sensors are typically used in situations where it is impractical to have humans on the ground. Because there are inadequate resources available to monitor these areas, a priority system must be established.

One proven method of establishing a reasonable priority of effort involves the development of a list of indicators unique to an event (or a template) for use when conducting intelligence preparation of the battlespace (IPB) operations. The creation of templates, which is dependent on the commander's scheme of maneuver, involves overlaying probable enemy CBRN courses of action, wargaming the results, and determining which indicators can be used to detect an event before that event is fully developed. Each indicator is signified by the output of some device or intelligence requirement (IR). Then, as indicators are detected, confidence that a particular event is taking place increases. Confirmation is provided when the point samplers sound an alarm. The use of templates allows analysts to capitalize on the collected data; however, there may be many permutations to the templated scenario, allowing for varied and measured responses and resulting in varying degrees of fidelity. Although none of the individual indicators reveal the complete story, multiple sources—derived from multiple technologies—inherently provide a more robust picture. For example, conventional, unattended ground sensors can provide an event notification of indirect fire on or near an NAI. This delivery indicator is, by itself, of little interest, but it could prove to be an important piece of the puzzle in the overall attempt to understand an unfolding event. In similar fashion, high-fidelity information, such as that obtained from a biological weapon detection citadel station like the Joint Point Biological Detection System, could represent the last near-real-time detection event in a string of indicators. Using complementary indicators, the chemical operations specialist or other analyst could develop possible scenarios.

The templates generated should reflect not only a knowledge of enemy doctrine and organizational and situational capabilities but also information received from various sensors and detectors. In some cases, the required information may be obtained through research or inference; in other cases, it may be necessary to generate the information through planned missions.

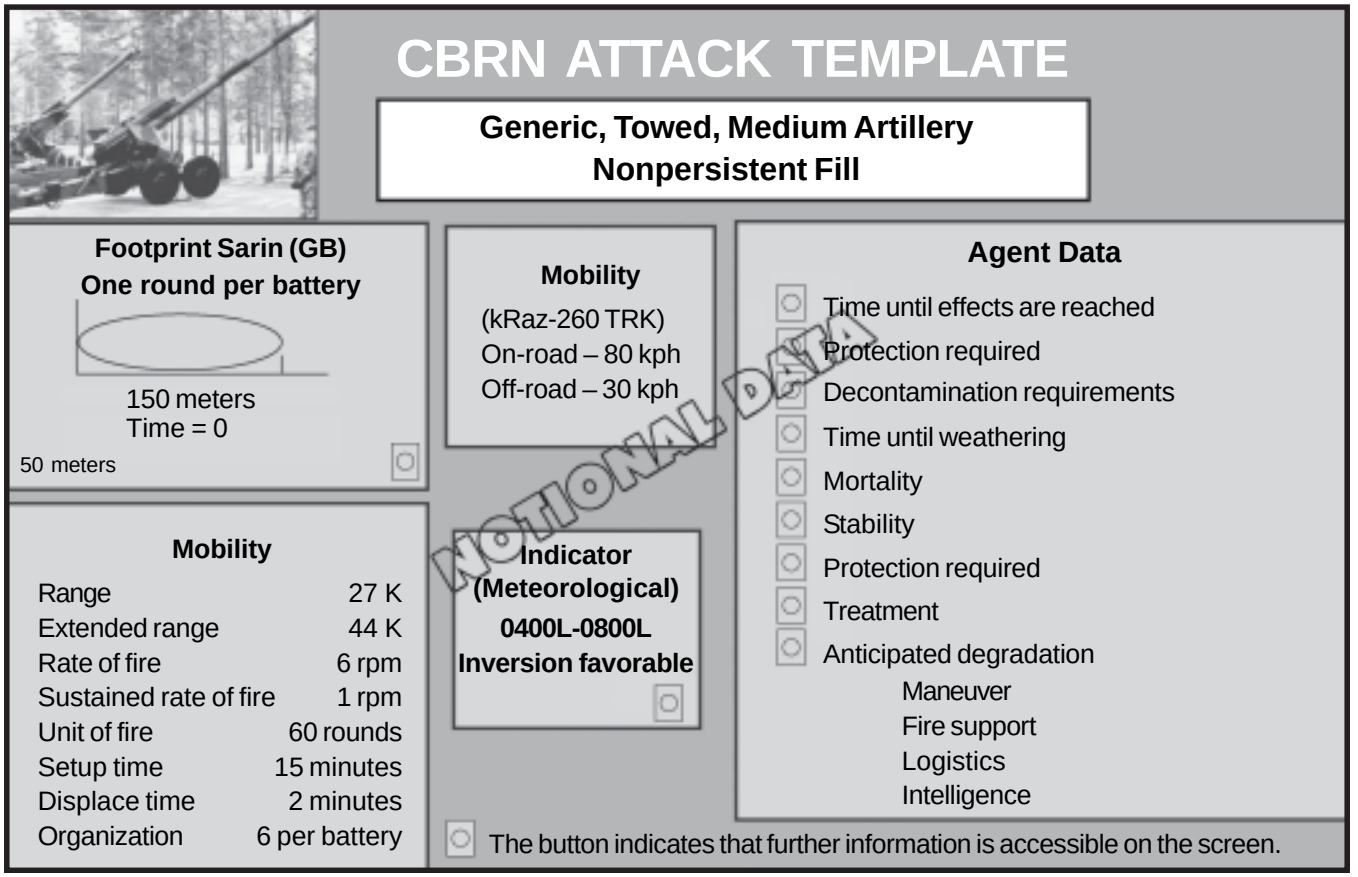
One type of information that lends itself particularly well to the templating procedure is meteorological data. If a CBRN attack occurs during midday conditions, when ambient temperatures are above 120 degrees Fahrenheit,

agent delivery conditions are not ideal and attack indications may not warrant the utmost level of concern. This would be especially true if decision support tools indicate that the performance of a specific CBRN technology application is challenged by the weather conditions. However, if an attack indicator is detected under extremely favorable meteorological conditions, serious concern may be justified.

The US Army Maneuver Support Center (MANSCEN) and the Joint Program Manager–Contamination Avoidance at Fort Leonard Wood, Missouri, are researching and analyzing future CBRN capabilities, paying special attention to the development of tools that manage the information generated. The user community is involved early in the development of new capabilities. User involvement is essential to getting it right and defining the human interface well before formal system testing begins. The experiments that are eventually conducted range from laboratory bench trials to field demonstrations and tabletop exercises. For example, the MANSCEN recently conducted simulations and a tabletop exercise to demonstrate a concept designed to integrate CBRN and non-CBRN indicators. The exercise included decision support tools that could be accessed by clicking on an icon on the computer screen if additional analysis data was required. An example of a template developed during the exercise is provided in the figure below.

Key personnel must be diverted from their everyday activities to support exercise training events. While this represents a difficult challenge for leadership during a time when resources are already stretched to the limit and beyond, the support of key personnel is essential to the success of the program. The ability to provide this support while continuing to produce world-class training and doctrine products is a reflection of the professionalism of Dragon Soldiers and civilian personnel.

Mr. Cress is the Soldier technology liaison officer (LNO) in the Joint CBRN Combat Development Division, MANSCEN Futures Center, Fort Leonard Wood, Missouri. He is employed by the Natick Soldier Center and supports the Edgewood Chemical and Biological Center in the areas of Soldier equipment, support equipment, airdrop operations, and chemical defense items.



Sample template

Radiological Operations on the Modern Battlefield

By Major Kevin Hart

Chemical Soldiers must deal with chemical, biological, radiological, and nuclear (CBRN) threats on the battlefield, regardless of their level of training and experience with these hazards. Radiation sources have been encountered during every major operation since Operation Joint Endeavor in Bosnia; however, until recently, only a small contingent of Dragon Soldiers was trained in radiation safety and had the skill set necessary to safely handle the "R" in CBRN.

Radiological sources range from common radioactive materials found in military units, such as tritium in fire control devices and nickel-63 in chemical detection equipment, to high-activity sources found in industry or contained in a terrorist's "dirty bomb." The old nuclear, biological, and chemical (NBC) paradigm only addressed nuclear hazards that affected the current operation. However, the shift in concern regarding the effects of full-spectrum CBRN threats has made it imperative that Dragon Soldiers be savvy in the art and science of identifying and mitigating hazards which may pose short- and long-term health risks to Soldiers.

Limited training is only one of the problems faced by Dragon Soldiers who handle radioactive materials. Doctrine for nuclear contamination avoidance (Field Manual [FM] 3-3-1, *Nuclear Contamination Avoidance*) only addresses radiological sources in a single-page chapter (Chapter 8).[1] However FM 3-11.4, *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection,* includes an appendix dedicated to full-spectrum radiological protection. Simple guidelines can help chemical staffs and units develop a plan to identify hazards, assess threat, and protect Soldiers from unnecessary exposure.

Training

Of all possible CBRN threats, radiological threats are the easiest to assess and manage, given current instrumentation. The difficulty is overcoming a natural fear of radiation and dealing with unfamiliar radiation measurement units. Some people are under the impression that thousands were killed from radiation released in events such as those that occurred at Three Mile Island (TMI) and Chernobyl. In reality, nobody died as a result of the accident at TMI, and 31 responders died as a result of the accident at Chernobyl.

If properly used, radiation detection instrumentation provides a real-time indication of whether an area is safe or not and, if it is, how long Soldiers can safely stay. None of the chemical-biological (CB) detection systems can provide this type of information so quickly and accurately. The key to success in responding to radiological threats is to have a good understanding of the capabilities and limitations of radiac equipment and know how to use data obtained with the equipment. Historically, detectors were rarely taken to the field for training. Now, however, new commercial trainers, which make use of global positioning systems, allow for more flexibility in training. The trainers may be configured to replicate situations like a radiological source in a shipping container or an area contaminated by a dirty bomb. Hands-on exercises are now a key component of radiological training.

An understanding of radiation measurement units is another key component to the successful management of radiological operations. The amount of exposure, the dose, and the dose equivalent are used to indicate how much damage may occur to an individual exposed to radiation. Problems arise when radiation measurement units must be converted, as many of the units are in simultaneous common use, depending on which radiation detection instrument is used. The ability to understand, convert, and compare values is enhanced when these units are properly aligned with respect to one another, as follows:

1 roentgen (R) = 1 rad = 1 rem = 1 cGy = 1 cSv

Where—

R = measurement of the electrical charge in the air resulting from X-ray or gamma radiation.

rad = the standard unit of absorbed dose or the energy deposited per gram of tissue mass.

rem = the dose equivalent of the radiation where the quality factor for X-rays and gamma radiation is 1.

cGy = centigray, the International System of Units (SI) unit of absorbed dose.

cSv = centisievert, the SI unit of dose equivalent.

Units of activity are other units that are used. Activity is a measure of how much radioactive material is present. It is measured in disintegrations per second and expressed as curies (Ci) (where 1 curie is equal to 3.7×10^{10} disintegrations per second—a great deal of radioactive material) or, using SI units, as bequerels (Bq) (where 1 Bq is equal to one disintegration per second—a small amount of radioactive material). For hazard analysis or risk assessment, the exact quantity of radioactive material present is not as important as the general magnitude. The relative hazard of various generalized quantities of radioactive material, in both standard and SI units, is provided in the table below.

Hazard	Standard Unit*	SI Unit*
High	Curie	Gigabecquerel
Medium	Millicurie	Megabecquerel
Low	Microcurie	Kilobecquerel
*Prefixes have been added to the SI units to make them approximately equivalent to the corresponding standard units.		

One of the most important aspects of protecting Soldiers from radiation exposure is knowing how much radiation is too much. The measured dose rate provides an indication of how long a Soldier can stay in an area without exceeding a preselected dose limit or, in military terms, the operational exposure guidance (OEG). For example, if the selected OEG is 25 cGy and the measured dose rate is 0.1 cGy per hour (cGy/hr), then a Soldier can stay in the area for 250 hours before exceeding the 25 cGy OEG. But, if the dose rate is 100 micrograys per hour (μGy/hr), the Soldier can stay in the area for 2,500 hours before exceeding the 25 cGy OEG. This example shows that the higher the dose rate, the less time there is before the OEG is exceeded. This also means there is less time to complete the mission. Risk-based guidance for low-level radiation encountered during military operations other than war is provided in FM 3-11.4 and the soon-to-be published FM 3-11.3, *Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Contamination Avoidance*. Armed with an understanding of the use of radiation detectors and units of measurement for radiation, it is possible to plan and safely execute operations in a radiological environment.

Planning

Likely locations of radiological sources should be identified during the mission analysis phase of an operation, rather than by accidentally encountering them during the operation itself. Radiation sources are used in most industries, including steel milling, aluminum foil manufacturing, petroleum processing, and heavy construction. Such industrial facilities should be priorities for requests for information (RFIs) and initial CBRN reconnaissance. Staff planners need to know whether sources located at these sites pose a radiological hazard. The primary information the staff planner uses to assess the threat from a radiological source is the source activity and the dose rate. Many sources are marked with their activity. Activities in the Ci or gigabecquerel (GBq) ranges are considered high-risk. Additionally, any source that has a dose rate in excess of 1 cGy/hr (equivalent to 1 rad/hr) at 1 meter should also be considered high-risk.

Depending on the enemy or civilian situation, radiological sources may need to be secured in place or moved to a controlled area to mitigate the risk. The staff planner must understand the civilian use of radiological sources before making a recommendation. Clearly, removing a source from a radiation therapy facility could have negative consequences for the local population by eliminating the ability to treat cancer. On the other hand, based on a threat evaluation, the benefit of removal may

Relocation of a radioactive waste drum containing radium in Bosnia

prove to outweigh the possible negative effect on the local population. Both the pros and cons must be considered. The identification and mitigation of high-activity, unsecured, or orphan radiation sources must be the priority.

The utilization of all battlefield operating systems must be considered during the development phase of a course of action. A simple operation to move an industrial radiography device from an unsecured construction site to a secured storage location requires much more than a team with radiac equipment. Security, fire support, transportation, radiological monitoring, decontamination, quick-reaction forces, public affairs, and host nation assets must all be synchronized. Even if the threat force has no prior knowledge of the radiation source being moved, the destruction of the vehicle transporting the source could create a radiological incident. Securing sources on site may also be an acceptable alternative. Placing sources in a pit and sealing them with concrete would certainly keep threat forces from easily accessing radioactive material. Consideration must be given to any status-of-forces agreement or applicable environmental regulations. Again, the proper synchronization of assets, along with host nation notification, is imperative.

Mission Execution

The necessity for a clear understanding of task and purpose cannot be overemphasized. Planners should know what survey teams need to accomplish. The survey teams, in turn, should do only what is specifically tasked or can be reasonably inferred from the stated purpose or intent. This is not the time to satisfy curiosity, as that could put the team at risk. For example, if the assigned task is to determine if radiation is present, the team should leave when radiation is detected in excess of ten times the background level. This is the suggested trigger level in determining whether radiation in excess of normal background is present (FM 3-11.4, Appendix D). If the assigned task is simply to determine the number and locations of sources, the team should do just that and refrain from removing those sources from the site.

There is little difference between conducting a conventional chemical reconnaissance mission and a radiological reconnaissance mission. Rather than using a chemical-agent monitor or M8 detector paper, the radiological reconnaissance team uses a radiac instrument. Additionally, the team leader must determine the applicable OEG, turn-back dose (Dtb), and turn-back dose rate (Rtb) for a radiological reconnaissance mission. The Dtb and the Rtb are risk control measures that the team uses to help stay under the OEG. They indicate the measured total dose or the measured dose rate at which the team should abort the mission. The team members still conduct traditional preventive-maintenance checks and services (PMCS), with an additional PMCS requirement to set total dose and dose rate alarms (corresponding to the Dtb and Rtb) on the radiac instrument. The team leader uses an AN/UDR-13 or AN/VDR-2 radiac set to track the unit radiation exposure status (the composite total dose of the unit) in accordance with FM 3-3-1 or FM 3-11.4. Other dosimeters (such as the DT-236 wristwatch dosimeter) or, if a more accurate dose recording is desired, a thermoluminescent dosimeter (TLD) from the US Army Ionizing Radiation Dosimetry Center at Redstone Arsenal in Huntsville, Alabama, may also be used.

For area reconnaissance, the team conducts the same searches and survey patterns specified in FM 3-11.19, *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Reconnaissance,*

Preventive-medicine detachment collecting soil samples to test for depleted uranium in Kosovo

and, if required, generates an NBC 4 report (release other than attack). For point reconnaissance of buildings, experience is the best guide. The surveyors move deliberately and systematically through the building and its rooms, using changes in radiac readings to locate radiation sources (similar to the method used to play the "hot-warm-cold" game). Inexperienced surveyors often spend too much time monitoring subtle changes in readings. A better technique is to establish a background level, set a trigger of ten times that level, and ignore any readings below that. The surveyor watches for the dose rate to significantly rise and then fall so that the source may be bracketed. He then marks the location with spray paint or another type of marker. The surveyor should keep in mind that gamma rays can travel through walls, so the marked source might actually be behind the wall. The team leader needs to maintain situational awareness of all survey team members to ensure that the surveyor in the adjacent room isn't spending time bracketing the same location. Because high dose rate sources can mask lower dose rate sources, it may be necessary to remove high dose rate sources from the immediate area so that lower dose rate sources may be located. Care must be taken, however, to ensure that neither the intent nor the parameters of the mission are exceeded. In addition, proper safety measures (described below) must be applied when handling any radiation source. The team leader must document the survey—indicating the locations of sources, measured dose rates and, if directed and the team is capable, the isotopes and activities of the sources.

The possibility of contamination of the area in general should also be considered. To check this possibility, the surface of the area being surveyed should periodically be wiped with a small cloth or other appropriate material. The cloth may then be moved to a background area and monitored for radiation. If the reading exceeds five to ten times the background level, the area may be contaminated and the team may need to be decontaminated. The locations where radiation readings were taken and contamination wipes were collected should be documented for later use.

Abandoned industrial radiation sources in Iraq

Safety

Doctrinally (FM 3-11.4, Appendix D), the Rtb is determined by the equation:

$$\frac{Rtb = 2 \times OEG \times speed}{distance}$$

However, this equation is only applicable when crossing large, contaminated areas of nuclear fallout in a vehicle. In most cases, a radiologically contaminated area does not fit this criteria. The purpose of calculating a Dtb and an Rtb is to mitigate the risk of radiation exposure by ensuring that the survey team does not exceed the OEG. Because the Dtb and the Rtb augment one another, they must be used together. For building surveys, the Rtb must be adjusted to allow the survey team the maximum opportunity to complete the mission. For example, if the OEG for a mission is 10 cGy and a survey team enters the target facility with an Rtb set at 10 cGy/hr, as long as that dose rate is not exceeded, the team may stay in the location for at least one hour. However, such a low Rtb could seriously limit the team's ability to conduct its mission. Raising the Rtb to 40 cGy/hr would allow work to continue at higher dose rates and, as long as the Rtb was not exceeded, would still permit the team to remain in the location for at least 15 minutes. The Dtb is doctrinally set at half the OEG, which limits the team; it would make more sense to set it at 80 to 90 percent of the OEG if it is expected to take only a short time to exit the radiation field.

Time, distance, and shielding are still valuable tools used to protect Soldiers from unnecessary radiation exposure.

- Limiting exposure time is a great way to keep doses as low as reasonably achievable (ALARA). But how does one go about limiting exposure time? It is done through planning. Developing, rehearsing, and implementing a plan prevents the team from standing in the radiation field trying to decide what to do next. Tasks must be prioritized so that things which really need to be done (putting out a fire, turning off a valve, or reading the information plaque on a high-activity source) are done first.
- Distance is the best method for reducing a radiation dose. If the mission does not require that a Soldier get near the source, he shouldn't.

(continued on page 38)

Retorts and Dragons: The Creation of Chemical Branch Insignia

By Mr. Kip Lindberg

When the United States entered World War I, it found itself woefully unprepared for the experience. Twelve other nations, including Portugal, could field more combatants than the small, peacetime American Army. The US military had only a pittance of modern implements, such as machine guns and rapid-fire artillery, necessary for an industrial war. Most obvious, however, was how unprepared the Nation was to engage in the chemical warfare taking place on the battlefields of Europe.

The United States had only a few specialists trained in gas warfare and no single organization prepared to design, produce, and distribute chemical munitions, detection and protective equipment, or alarms. Four Army branches and one civilian agency (Bureau of Mines) were given the task of providing these services, in addition to their primary duties. However, the pressure of wartime requirements, combined with the inherent problems of accomplishing primary missions, made interbranch cooperation impossible. Military officials quickly discovered that a successful gas warfare program required consolidation under a single organization.

The Gas Service Section of the American Expeditionary Force (AEF) was created to shepherd the United States in the quest to become a world leader in chemical warfare. And with this specialization came the need for a new designating insignia. Approved in December 1917, the new insignia—a benzene ring superimposed in the center of crossed retorts—reflected the scientific origin of chemical warfare. The retort is a universally recognized article of laboratory equipage, dating back to the beginning of chemistry, and is necessary to extract volatile products from liquids through the application of heat. The pairing of retorts followed the tradition of crossed insignia previously established by the Infantry, Cavalry, and Artillery Corps. The hexagonal design of the benzene ring was also symbolic of chemistry and mirrored the chemical model of benzene (with its bonding of six carbon and hydrogen atoms).[1]

The initial, limited production of officer insignia was cast in bronze and designed to be worn on the sides of the stand-up collar of the officer M1912 tunic. The height of the insignia was specified at 3/4 inch; however, no length was given, leading to variations among manufacturers. For enlisted personnel, an embroidered, cloth version bearing the crossed retorts and benzene ring was produced for sleeve display. This was soon supplemented by the same design cast on a 1-inch bronze disk and worn on the stand-up collar opposite the general service "US" disk. Both officer and enlisted insignia were produced in dulled or blackened bronze, making them less conspicuous to the enemy. When the Gas Service Section was redesignated the Chemical Warfare Service (CWS) on 28 June 1918, the insignia was retained.[2]

But the crossed retorts and benzene ring were not popular with all who wore it. The scientific symbolism was lost to some of the CWS Soldiers serving overseas on the battlefields of Belgium and France, especially those whose primary role was to drop gas munitions on enemy positions. The Chief of the Overseas Gas Service Section, Lieutenant Colonel Amos Fries, voiced their dissent: "We in the field," he wrote, "emphasized the fighting value of chemical warfare . . . ." However, in the United States, a large proportion of the officials in control were research and development, production, and chemical engineers. They looked upon the CWS as predominantly chemical and developed the insignia from that point of view.[3]

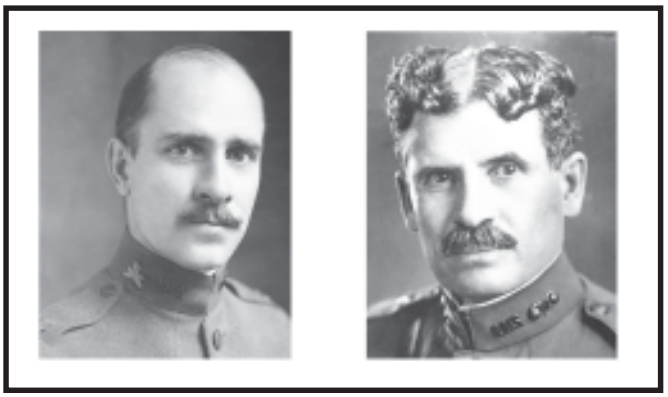
Fries petitioned his commander, Major General William Sibert, Chief of the CWS, to redesign the insignia. Sibert championed the cause, writing on 12 August 1918 to the Commander of the AEF, General John J. Pershing, that "the overseas section, which includes the Division gas officers and the gas and flame troops, desires an insignia a little more warlike than that of the old Chemical Service sector. The most effective way of delivering gas is through the gas shell . . . . [Therefore,] it is recommended that the

insignia of the Chemical Warfare Service be crossed gas shells surmounted by a dragon." The idea met with Pershing's approval, and the following month he forwarded the recommendation to the Adjutant General with his endorsement. A sample insignia—designed by the prestigious jewelry firm of Bailey, Banks, and Biddle—was cited by Pershing as the example to follow.

The official response was swift. On 23 September 1918, the Secretary of War disapproved the request, stating that ". . . in order to enable officers to concentrate their attention upon matters which are of vital importance in preparation for the present war, [we] will give no consideration to proposed changes in organization, equipment, uniform, or anything else during the war which are not of the above-mentioned importance in preparation for or in the war."[4, 5]

News of the disapproval was slow to reach France (or at least slow to be enforced). On 25 October 1918, the *Stars and Stripes*, the official newspaper of the AEF, printed the following announcement regarding the redesign of the CWS insignia: "The old insignia was so highly symbolical that it didn't hardly symbolize anything to unscientific and war-hardened minds. Its two crossed chemical retorts looked to the uninitiated like the irons of golf sticks, and were reminiscent of the ancient pottery and clay pipes of the mound builders. Also, officers thought crossed retorts were not sufficiently warlike. After the chemistry end of their work is done, they have to do the mechanics of making shells—with the business of making deadly things to throw at the Germans. They wanted an insignia that had something fierce about it. And now they've got it!"[6]

But that was not quite the case. Anticipating that approval of the proposed design was forthcoming, contracts had been placed and boxes of the "dragon over shells" officer insignia were already arriving in France and being sold through the AEF quartermaster office. The two enlisted versions—the cloth patch for Privates First Class and the 1-inch cast bronze collar disks—were also placed in production, although not in the large numbers produced for officer insignia. Soon the crossed retorts and benzene ring and the dragon-over-shells insignias were being worn throughout France. And they began appearing in the United States, sported by returning CWS personnel. To add to the confusion, most of the officers of the 1st Gas and Flame Regiment (which had been the 30th Engineer Regiment prior to July 1918) refused to replace their castle



Examples of collar insignia

insignia with either of the CWS insignias. By the fall of 1918, three different insignias were being worn by members of the CWS.[7, 8]

The end of the war brought the wearing of the dragon-over-shells insignia to an end. As the CWS dropped from its wartime strength of 20,518 officer and enlisted personnel to less than a tenth of that number by 1920, most of the unapproved insignia had dropped from sight, going home with departing personnel, destined to be forgotten in dark trunks and dusty attics. Some, however, were retained in the collection of the US Army Chemical Corps Museum at Fort Leonard Wood, Missouri, where they continue to illustrate the early design tribulations of Chemical Corps insignia.

Endnotes

[1]War Department, Change 1, Special Regulation 42, 29 December 1917.

[2]William K. Emerson, *Encyclopedia of United States Army Insignia and Uniforms*, University of Oklahoma Press, 1996, pp. 375–378.

[3]"Recollections of Major General Amos A. Fries (Retired), former Chief of the Chemical Warfare Service," *Chemical Warfare Service Veterans Association Bulletin*, September 1942.

[4]Cablegram message No. 1684 from General John J. Pershing, Commanding General of the American Expeditionary Force, to the Army Chief of Staff, 16 September 1918.

[5]Memorandum from the Adjutant General of the Army to General John J. Pershing, Commanding General of the American Expeditionary Force, France, 26 September 1918.

[6]"New Chemical Insignia," *Stars and Stripes*, Vol. 1, No. 38, 25 October 1918, p. 5.

[7]US Army Institute of Heraldry Fact Sheet, circa 1965, showing AEF quartermaster price lists, France, 1918.

[8]William K. Emerson, *Encyclopedia of United States Army Insignia and Uniforms*, University of Oklahoma Press, 1996, pp. 375–378.

Mr. Lindberg is the curator of collections at the US Army Chemical Corps Museum.

IRON FURY EXERCISE TESTS NCO KNOWLEDGE

By Mr. Richard Le Blanc

Planning stability operations while fighting insurgents and handling a barrage of media inquiries may be routine to senior military officials, but for those completing the Advanced Noncommissioned Officer Course (ANCOC) at Fort Leonard Wood, Missouri, the task can seem overwhelming. Still, the Maneuver Support Center (MANSCEN) Noncommissioned Officer (NCO) Academy has incorporated this event into a weeklong simulation exercise called *Iron Fury*. More than 30 students from MANSCEN Chemical ANCOC 04-05 participated in this exercise 31 October–4 November 2005.

The exercise was supported by Battle Training and Simulation Division (BTSD) staff members and senior mentors from the Chemical Captains Career Course (CMC3) 04-05. The concept for senior mentor support—known as the *Senior Mentorship Program*—is the brainchild of the Chemical ANCOC first sergeant and has proven to be a great success in Iron Fury.

The senior mentors augment the small group leaders (SGLs) in guiding students during this very critical training. Comments from the SGLs have been very positive regarding the program. The senior SGL states that the tactical operations centers (TOCs) within the BTSD provide students with the forum to execute the military decision-making process (MDMP) at the brigade combat team level and teaches them the invaluable skill sets needed to advise commanders as chemical, biological, radiological, and nuclear (CBRN) NCOs. Additionally, the training forum provides Chemical ANCOC and CMC3 students the opportunity to work together, building a foundation in the critical officer-NCO relationship. The comments from the senior mentors have been very positive, with comments such as: "Integration was a key—good insight of MDMP," "NCOs looked at the nuts and bolts of the operation," and "[I] saw the whole process [and] where to fit in and support the plan."

Iron Fury is actually a large practical exercise that is the culmination of a series of building block events from prior weeks of training. The exercise is designed to teach students the process of MDMP and how to apply these learned skills in a realistic, complex simulation. The students are brought together so that they can see the interaction between themselves and can recognize how capabilities are integrated into a combined arms operation. During the exercise, the students act as commanders and staff officers in a tactical scenario and make decisions based on what they learned during professional development. The exercise uses a combination of computer simulations, digital products, briefings, white cell information, and intelligence reports to develop a realistic common operating picture (COP). The students are given a division level operations order and placed in simulated brigade TOCs. The TOCs include a chemical battalion and a nuclear, biological, and chemical center (NBCC).

When the students are in their respective brigade TOCs, the simulation, interaction, and information flow begin. As the simulation proceeds, students in surrounding units get information and relay it over the radio to the division TOCs, just as they would do in an actual theater of operations. Information is also sent to the brigade TOCs through electronic media. All of the division and brigade TOCs in the simulated digital operations center are intertwined through an intranet that enables the students to relay real-time information sharing. The students formulate plans based on situational reports from their

Soldiers working in an operational cell

division and nearby units. Information exchanges occur simultaneously, flowing vertically within units; horizontally across units; and through e-mail, shared folders, and collaborative planning within operational cells. White cell information (additional battlefield characteristics) is added to introduce complexity in the students' working environments. To ensure that student training material remains relevant, BTSD leaders constantly relook and refine Iron Fury by incorporating lessons learned from current operations and updated critical task lists.

Engaging a canny, treacherous enemy causes students to develop refined warfighting strategies. As the students perform their military planning, they are forced to develop a plan against possible enemy actions. The enemy profiled in the exercise uses tactics and capabilities similar to those being used by current enemies of the United States. However, Iron Fury offers Soldiers the full-spectrum capability to conduct conventional operations in complex rural and urban terrains. It is a total training package that encompasses force-on-force scenarios, battles with insurgency forces, addresses a myriad of problems with the civilian population, and transitions to stability operations.

Traditionally, stability operations have been the most challenging part of any operation. It is only during the past decade that stability operations have been a primary focus in Army planning. Stability operations include providing internal protection for the civilian population, establishing nation-building operations, organizing a police force, and providing food and water—operations not performed in prior conflicts.

Simulation scenarios offer Soldiers the advantage of becoming familiar with updated and upgraded equipment—an option often not available in traditional field training. The ability to manipulate the enemy and create scenarios with diverse battlefield placement and timelines provides students with a more detailed picture of an asymmetrical operational area. The simulation allows the SGLs to challenge the students with a tactical field environment, where Soldiers and units maneuver on the battlefield. The exercise can be halted at any time to perform a discussion and after-action review on issues just addressed and then continued to completion. This would be very hard to do in a field exercise.

Soldiers hurriedly prepare for a combined arms rehearsal.

Conducting training in a controlled environment, where outside factors do not come into play, is a safe and cost-effective method. Can you imagine the cost to send a division to the National Training Center (NTC) or a brigade to the Joint Readiness Training Center (JRTC)? Simulation is a building block to higher-level exercises and saves the US Army money on equipment and resources.

Mr. Le Blanc is a chemical analyst with Anteon Corporation. Anteon provides support for simulation training in the BTSD. Mr. Le Blanc is a retired chemical master sergeant with more than 23 years of service to the US Army Chemical Corps.

86TH CHEMICAL MORTAR BATTALION ASSOCIATION REUNION

The 86th Chemical Mortar Battalion Association will hold a reunion in Chattanooga, Tennessee, 8–12 May. The following activities are offered (to be paid at check-in):

- 8 May, check-in.
- 9 May, tour of Chattanooga and lunch ($59 per person).
- 10 May, riverboat lunch and admission to the Tennessee aquarium ($59 per person).
- 11 May, reunion banquet ($28 per person).
- 12 May, breakfast (required name tag purchase at $6.95 per person).

The $15 fee is due when registration is made. Make checks payable to the 86th Chemical Mortar Battalion.

If you plan to attend, contact Mr. George Murray, 818 West 62d Street, Anniston, AL 36206, (256) 820-4415.

A MODEST PROPOSAL:

SHATTER THE RETORTS, DEFUSE THE BOMB, AND STABILIZE THE ATOM!

By Colonel Robert D. Walk

The Army is changing! Individual capabilities must be such that Soldiers maximize their value-added contributions to the Army. At a time when Soldiers are required to do more with less, chemical Soldiers are limited by what they are trained and equipped to do—military chemical, biological, radiological, and nuclear (CBRN) (pronounced *see-burn*) material detection and response. Unfortunately, there are insufficient chemical positions to cover higher-level staff requirements. Explosive ordnance disposal (EOD) units are in high demand for their skills and cannot provide the needed explosive coverage. Functional area (FA) 52 officers (nuclear, research, and operations personnel) cover some of the shortage, but they do not have the broad background in CBRN operations that chemical officers possess. Additionally, there is a gray area when referring to the terms *all-hazard response* and *chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE)* (pronounced *see-burn-ee*).

Everywhere you look, you see references to CBRNE operations. While it is true that all Army units perform some CBRNE response operations, there are a few elements with specified responsibilities in this area. This article will discuss the elements of the Army that perform CBRNE response operations and will argue the potential benefits of consolidation of some of these assets into one branch of expertise. The new branch, possibly termed the *CBRNE Corps*, would combine the lineages of all component elements and encompass a wide scope of responsibilities. This article will not discuss the benefits of creating a joint-service branch—that will come later.

The Chemical Corps is the deployable "Big Army" operational-response capability against CBRNE hazards. The EOD units of the Ordnance Corps provide the response capability for weaponized CBRNE. FA 52 personnel provide the knowledge needed to perform the technical aspects of radiological and nuclear responses. The Engineer Corps provides installation fire and emergency services, with the installation environmental office providing installation hazardous material (HAZMAT) response and remediation operations. Finally, the Medical Corps provides expertise on the environmental and occupational effects of low-level hazards and the clinical aspects of CBRNE exposure.

Department of the Army Pamphlet (DA Pam) 600-3 states that "The chemical branch is a combat support branch that is focused primarily on warfighting operations and training in support of chemical, biological, radiological, and nuclear (CBRN) defense; obscurants and flame employment; biological and chemical arms control verification; smoke and flame munitions technology and management; support of weapons of mass destruction (WMDs) force protection programs; consequence management; and CBRN military support to civil authorities. Additional functions include scientific, developmental, and material management activities for these programs. The branch provides the Army with a highly trained corps of CBRN experts to advise commanders and staffs at all levels in the Department of Defense and lead chemical units."[1] Specialized areas of the chemical branch include technical escort units with technical escort Soldiers (additional skill identifier [ASI] L3); armored

chemical-biological (CB) reconnaissance units with reconnaissance Soldiers (ASI L [Fox], L1 [master Fox], and L6 [Stryker]); Army National Guard civil support teams (CSTs) (skill qualification identifier [SQI] R [enlisted] and R1 [officers]); and US Army Reserve domestic-response casualty decontamination (operationally trained) and domestic-response reconnaissance (civilian HAZMAT-trained) units. Organized during World War I to meet the offensive requirements of the Chemical Warfare Service, the chemical branch has expanded over the years to meet the increased threats in CBRN warfare and provide support to missions working to eliminate enemy capabilities.

The EOD Soldiers and units enable the Army to identify, locate, render safe, handle, remove, and dispose of US and foreign unexploded conventional, nuclear, and chemical munitions. Additionally, the EOD units advise and assist law enforcement agencies in the removal and/or neutralization of explosive devices; provide support and protection to the President of the United States, senior American officials, and military and foreign dignitaries; and support intelligence activities through the analyses of foreign munitions. Originally created as a technical element for a combat service support branch during World War II, EOD Soldiers were primarily drawn from unit ordnance ammunition specialists. Unfortunately, most of the Army ammunition expertise was eliminated in the 1990s because of the discontinued nuclear mission and the new requirement to contract conventional ammunition missions. These changes left EOD officers and enlisted personnel as orphans in the predominantly maintenance-focused ordnance branch.

The FA 52 specialty was created during the Cold War when the threat of nuclear warfare was high and the Army had a nuclear mission and a need for nuclear warfare specialists. DA Pam 600-3 states that FA 52 specialists are "within the institutional support career field where trained and experienced officers apply knowledge and expertise in nuclear and related WMDs in developing national and theater strategy, plans and policy; in conducting weapons effects research and analysis, to include consequence of execution and consequence management; in international treaty formulation and verification; and in planning the employment of nuclear weapons to support theater and strategic operations." FA 52 officers, located at higher-level Army staffs, provide technical expertise on nuclear operations. In fact, many of these officers provide expertise due to the scarcity of chemical officers to fill upper-level positions. With the removal of the Army's nuclear mission and the dissolution of the Warsaw Pact, the Army has adjusted the FA 52 mission to include other WMDs.

Proposal

The Army would greatly benefit from the creation of a new branch! The Army CBRNE Corps would replace the current EOD element, Chemical Corps, and FA 52 specialty. Personnel and units from the three elements would be used to create the new branch. Because each element is currently led by superior leaders and is composed of highly trained and proud Soldiers, the disestablishment of the old and creation of the new must be done with courtesy, respect, and care. No one element

Proposed CBRNE Corps Vision

The CBRNE Corps is a combat support branch that is focused on—

- Warfighting operations and training in support of CBRNE defense.
- Smoke, obscurants, and flame employment.
- Chemical, smoke, and flame munitions technology and management.
- Support of WMD force protection, interdiction, and elimination programs.
- The identification, locating, rendering safe, handling, removal, and disposition of US and foreign unexploded conventional, nuclear, and chemical munitions.
- CBR domestic protection programs.

At senior levels, the Corps provides expertise in—

- CBRNE operations, national and theater strategy, plans, and policies.
- CBRNE weapons effects research and analysis.
- International CBRNE treaty formulation and verification.
- The planning and employment of nuclear weapons to support theater and strategic operations.

Additional functions include scientific, developmental, and material management activities for CBRNE programs.

can be allowed to have a disproportionate amount of power; all elements would share in the development of the new branch vision. In the creation of the CBRNE Corps, no base element (chemical, EOD, or FA 52) would be large enough or powerful enough to overpower the others in the creation of the vision and character of the Corps. For example, if the EOD specialty was redesignated as part of the engineer branch, they would be so small in relation to the other engineer branch elements that the EOD leadership would only have a small say in the overall branch vision. This could not happen in the CBRNE Corps consolidation.

The new CBRNE Corps must be created using senior leadership from all three elements and led by a general officer determined to provide Soldiers with specialized CBRNE knowledge. This leadership must create a Corps vision that incorporates the specialized knowledge of each element and provides the Army with integrated CBRNE response capability and doctrine.

Change

Talking about change is one thing; making the change is another. A reorganization of this magnitude requires solid staff work and a careful step-by-step process. On the Army staff, organizational integrators and staff synchronization officers ensure that all changes are properly coordinated and synchronized across the doctrine, organization, training, materiel, leader education, personnel, and facilities (DOTMLPF) spectrum.

Doctrine

Doctrine will change for the better. One centralized location will enable the commandant to properly coordinate and influence all doctrine supporting CBRNE response operations and ensure that all Army elements speak a common language. To ensure maximum standardization, all types of CBRNE response operations will be given equal consideration. This standardization will likely require changes to and the elimination of current doctrine publications. The CBRNE Corps must be able to work worldwide, and the new training and doctrine must reflect this requirement. We can no longer apply different standards to meet the mission requirements at home and overseas. The requirement to train Soldiers in two standards is too expensive and confusing; one common doctrinal standard must be used that meets both sets of standards. While it may not always be possible to standardize doctrine and training, we owe it to our Soldiers and the Nation to maximize our response commonalties and create the best defense possible.

Organization

The 20th Support Command (CBRNE), which includes Chemical Corps, EOD, and FA 52 personnel, operates as a cohesive organization, providing a one-stop shop for Army CBRNE response. Combining elements into one organization under a major command simplifies the Army's ability to respond to CBRNE threats. The future organization will include an Active Army chemical brigade, two Active Army EOD groups, and an Army Reserve unit–consequence management (ARU-CM). Unit level training will also focus more on coordinated responses to CBRNE hazards at home and overseas.

The immediate impact on Army organizations will be minimal, but as integration occurs, there may be a need for consolidation in EOD and chemical units and an overall reduction in the number of units to create a better force structure. The new force structure will have improved operational capabilities for CBRNE response, to include HAZMAT response and CBRNE interdiction, mitigation, and elimination operations.

Materiel

Ultimately, the Department of Defense (DOD) will benefit from the branch consolidation through a melding of materiel development in all CBRNE areas. Currently, there is little cross fertilization of ideas between the Chemical Corps and EOD. Even within the chemical branch, there is little mating of requirements between the operational side of the Corps and the technical escort units. This is unfortunate and must change. Equipment developed for one CBRNE area may be easily adapted to others. The US Army Chemical School (USACMLS), acting as the combat developer, would ensure that the changes take place. The end result, achieved over time, would amount to a cost savings for DOD.

Training and Personnel

Entry level officers will attend basic officer leader training for CBRNE specialists. This training will prepare officers for transition into EOD units (after qualification training), line battalions, or traditional CBRNE units. The end result will be an expanded capability throughout the Army on such operation aspects as explosive ordnance reconnaissance, HAZMAT, and CBRN response operations. As these officers advance in grade, they can specialize in areas such as CBRNE staff specialists (to replace FA 52 specialists) and gain knowledge across the CBRNE spectrum (as opposed to knowledge focused on nuclear warfare).

Soldiers in the CBRNE Corps must be well trained in specialized areas and to a common standard. Improved specialized training will provide unit commanders with increased support in basic CBRNE hazard detection and avoidance. Entry level Soldiers will be offered a new curriculum that provides a basic level of CBRNE training. (An analysis determination may result in a need to lengthen initial entry training. Lengthening any course is an anathema at the US Army Training and Doctrine Command but is possible if properly supported by an expert analysis.) Additional specialized training will help prepare Soldiers for assignments in their selected career fields. As Soldiers gain knowledge and experience, they may choose to remain as generalists in CBRNE operational response operations or select a specialty with more technical positions. Technical specialties may include escort operations, dismounted reconnaissance operations (including HAZMAT operations), mounted reconnaissance operations, EOD operations, and sensitive-site exploitation.

Facilities

Additional training facilities would be required for the new branch, including areas for operations in explosive detection, rendering safe, and destruction; chemical hazard detection and protection; environmental chemistry and instrumentation; radiation detection and instrumentation; and response (including mass-casualty decontamination, HAZMAT, and contamination control). And it is a given that new specialized training facilties (such as the First Lieutenant Joseph Terry CBRN Responders Training Facility under construction at Fort Leonard Wood, Missouri) are required to support future operations.

Conclusion

In this article, we have looked at the possibility of creating a new Army branch out of three disparate elements: the Chemical Corps, the EOD technical specialty, and FA 52 nuclear research and operations. All three elements represent the continuance of Cold War ideas and may not represent the best fit for today's modular Army. Combining the three elements would create a branch more capable of dealing with the modern CBRNE threat.

Reference

[1]DA PAM 600-3, *Commissioned Officer Professional Development and Career Management*, 14 October 2005.

Colonel Walk is the Deputy Assistant Commandant for the US Army Reserve, US Army Chemical School, Fort Leonard Wood, Missouri.

("Radiological Operations on the Modern Battlefield" continued from page 30)

A source should never be handled directly; instead, some type of aid (pole, kitchen tongs, shovel, chain, forklift, front loader) should be used. The inverse square law applies to radiation dose rates. Given a dose rate of 10 cGy/hr at a distance of 1 meter, the dose rate at 2 meters would only be 2.5 cGy/hr. On the other hand, the dose rate at 25 centimeters would be 160 cGy/hr.

- Shielding is sometimes the most difficult method to employ. Placing anything between the surveyor and the source reduces the dose, but the denser the material, the better it works. For example, steel makes a better shield than sand. Adequate shielding will most likely need to be coordinated, and the delivery will need to be synchronized. However, existing items (buildings, vehicles, terrain, wooden pallets) may be used as makeshift shielding. In any case, exposure should not be risked for the purpose of placing a shield.

Conclusion

Train the Corps! The need for chemical Soldiers to conduct radiological operations is not going to go away. If anything, it will become more important. Possessing the skills necessary to identify likely source locations and assess and mitigate the threat will continue to demonstrate that the Chemical Corps is a vital contributor on the modern battlefield. Basic analytical skills, training, and practice will be the keys to success.

Endnote

[1]FM 3-3-1 will be superseded by FM 3-11.3, to be published within six months.

References

FM 3-3-1, *Nuclear Contamination Avoidance*, 9 September 1994.

FM 3-11.4, *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection*, 2 June 2003.

FM 3-11.3, *Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Contamination Avoidance*, to be published within six months.

FM 3-11.19, *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Reconnaissance*, 30 July 2004.

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Transforming Decontamination Doctrine: The Value-Added Effect of Decontamination Operations

By Mr. Mike Robinson

Transformation: The purposeful change of current procedures to meet new challenges and increase the value-added effect to the customer.

Decontamination operations have not changed much over the past 20 years. When I entered the Chemical Corps in 1981, decontamination doctrine was designed to defeat Cold War enemies. We knew the enemy would strike our forward armor and infantry forces with heavy amounts of persistent chemical agents. Its goal was to force us into mission-oriented protective posture (MOPP) 4 status so that our forces would quickly become exhausted and ineffective. We planned to counter the attack with operational and thorough decontamination operations, with the goal of getting a large number of forces back into battle quickly (especially armor). Speed in decontamination operations meant that some units would fight in MOPP 4 gear. But current global operations have changed the focus of the US military from large unit operations to small unit operations. And it is time we transform decontamination to fit the contemporary operational environment.

We should define the terms for decontamination in a simple and meaningful way:

- **Immediate Decontamination.** The definition for immediate decontamination remains the same—the first and automatic action to protect Soldiers from direct exposure to contamination. To accomplish this mission, Soldiers use their personal skin decontamination kits or hot, soapy water to reduce the hazard level. The action is performed without any command direction. Immediate decontamination is a common task. Soldiers also perform immediate decontamination on their equipment to reduce the gross level and spread of contamination. Time, mission, and supplies always effect this operation.
- **Operational Decontamination.** The definition for operational decontamination has changed and now includes two new levels of effort—*minimal* and *extensive*. Operational decontamination on equipment and vehicles is still performed at the lowest unit level. The chemical officer and NCO are now required to brief the maneuver commander on minimal and extensive operational decontamination missions. Chemical Corps units, when available, will provide assistance to complete the mission.
  - **Minimal.** Minimal operational decontamination has a measurable standard of completion—no detectable vapor hazards. This standard provides Soldiers with a definite time period in which it is safe to remove their protective masks. Removing the protective mask is a benefit to the Soldier. Doctrine may term this new level *MOPP 5*. Soldiers will still wear gloves, boots, and overgarments. Vapor hazards are continuously monitored with appropriate sensors, such as the chemical-agent monitor (CAM). To accomplish this mission, units will use all available resources to reduce the hazard levels. Field-expedient methods include hot, soapy water; steam cleaners; car wash facilities; and standard decontaminants (DF 200 or super tropical bleach [STB]). Chemical companies may be available for additional equipment assets. Hidden dangers from chemicals trapped in porous materials or in the cracks of vehicles may pose a contact hazard to Soldiers' skin. But the risk is minimized by the protective garments and is outweighed by the value-added improvement of not wearing a protective mask. Lowering MOPP levels is always based on the mission parameters and the risk to the Soldiers.
  - **Extensive.** Extensive operational decontamination also has a measurable standard of completion—no measurable vapor or contact hazards. This operation allows Soldiers to remove all protective overgarments. As the title implies, extensive decontamination requires significant manpower, time, supplies, and equipment resources. In many cases, it may be more effective to dispose of equipment as hazardous waste than to

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DOCTRINE UPDATE

US Army Chemical School
Directorate of Training and Training Development
Doctrine Development Division

Publication Number	Title	Date	Description
Current Publications			
FM 3-11 MCWP 3-37.1 NWP 3-11 AFTTP(I) 3-2.42	Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Defense Operations	10 Mar 03	A multiservice tactics, techniques, and procedures (MTTP) manual which provides commanders and staffs a key reference for the planning and execution of service chemical, biological, radiological, and nuclear (CBRN) defense operations, with focus on the passive-defense component of counterproliferation. **Current status**: Formal assessment FY 06.
FM 3-3 FMFM 3-11-17	Chemical and Biological Contamination Avoidance	16 Nov 92 C1 29 Sep 94	An MTTP manual which details the CBRN Warning and Reporting System, how to locate and identify chemical-biological contamination, and how to operate in and around CBRN contamination. **Current status**: Under revision FY 06 (will be renumbered [FM 3-11.3] and renamed and will integrate FM 3-3-1).
FM 3-11.4 MCWP 3-37.2 NTTP 3-11.27 AFTTP(I) 3-2.46	Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection	2 Jun 03	An MTTP manual which establishes principles for CBRN protection and addresses individual and collective protection (COLPRO) considerations for the protection of the force and civilian personnel. **Current status**: Current.
FM 3-5 MCWP 3-37.3	NBC Decontamination	28 Jul 00 C1 31 Jan 02	An MTTP manual which addresses the principles of CBRN decontamination; the levels of CBRN decontamination; and the tactics, techniques, and procedures (TTP) for CBRN decontamination operations in a tactical environment. **Current status**: Under revision FY 06 (will be renumbered [FM 3-11.5] and renamed).
FM 3-6 AFM 105-7 FMFM 7-11-H	Field Behavior of NBC Agents (Including Smoke and Incendiaries)	3 Nov 86	An MTTP manual which addresses the battlefield influences of weather and terrain and the use of smoke on CBRN operations. **Current status**: Formal assessment FY 06.
FM 3-11.9 MCRP 3-37.1B NTRP 3-11.32 AFTTP(I) 3-2.55	Potential Military Chemical/ Biological Agents and Compounds	10 Jan 05	An MTTP manual which provides commanders and staffs with general information and technical data concerning chemical-biological (CB) agents and other compounds of military interest, such as toxic industrial chemicals (TICs). **Current status**: Current.
FM 3-11.11 MCRP 3-3.7.2	Flame, Riot Control Agent, and Herbicide Operations	19 Aug 96 C1 10 Mar 03	An MTTP manual which describes the doctrine and TTP for employing flame weapons, riot control agents (RCAs), and herbicides during peacetime and combat. **Current status**: Current.
FM 3-11.14 MCRP 3-37.1A NTTP 3-11.28 AFTTP(I) 3-2.54	Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Vulnerability Assessment	28 Dec 04	An MTTP manual for conducting CBRN vulnerability assessments; analyzing, managing, and assessing risks; and measuring, mitigating, and reducing vulnerabilities. **Current status**: Current.
FM 3-11.19 MCWP 3-37.4 NTTP 3-11.29 AFTTP(I) 3-2.44	Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Reconnaissance	30 Jul 04	An MTTP manual for planning and conducting CBRN reconnaissance operations to detect, define, limit, mark, sample, and identify CBRN and toxic industrial material (TIM) contamination. **Current status**: Current.

NOTE: Current CBRN publications can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil/*> or at the USACMLS Doctrine Web site at <*http://www.wood.army.mil/cmdoc/index.htm*>.

DOCTRINE UPDATE

US Army Chemical School
Directorate of Training and Training Development
Doctrine Development Division

Publication Number	Title	Date	Description
Current Publications (Continued)			
FM 3-11.21 MCRP 3-37.2C NTTP 3-11.24 AFTTP(I) 3-2.37	Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Aspects of Consequence Management	12 Dec 01	An MTTP manual which provides commanders and staffs a key reference for mitigating the CBRN aspects of consequence management. **Current status**: Under revision FY 06.
FM 3-11.22	Weapons of Mass Destruction–Civil Support Team Tactics, Techniques, and Procedures	6 Jun 03	An Army-only manual which provides the suggested doctrinal TTP for use by WMD-CSTs, which are designed to provide support to local, state, and federal response systems. **Current status**: Under revision FY 06.
FM 3-11.34 MCWP 3-37.5 NTTP 3-11.23 AFTTP(I) 3-2.33	Multiservice Procedures for Nuclear, Biological, and Chemical (NBC) Defense of Theater Fixed Sites, Ports, and Airfields	29 Sep 00	An MTTP manual which provides multiservice reference for planning, resourcing, and executing CBRN defense of fixed sites, ports, and airfields. **Current status**: Under revision FY 06.
FM 3-50	Smoke Operations	4 Dec 90 C1 11 Sep 96	An Army-only manual which provides the suggested doctrinal TTP to use smoke and obscurants to attack and defeat specific enemy targets, sensors, target acquisition systems, weapon guidance systems, and other enemy electro-optical devices. **Current status**: Formal assessment FY 06 (will be renumbered [FM 3-11.50] and will integrate FM 3-101-1).
FM 3-11.86 MCWP 3.37.1C NTTP 3-11.31 AFTTP(I) 3-2.52	Multiservice Tactics, Techniques, and Procedures for Biological Surveillance	4 Oct 04	An MTTP manual for planning and conducting biological surveillance operations to monitor, detect, sample, identify, report, package, and evacuate samples of biological warfare agents. **Current status**: Current.
FM 3-101	Chemical Staffs and Units	19 Nov 93	An Army-only manual which provides fundamental principles for chemical staff functions, command and control of chemical units, and chemical unit employment. **Current status**: Under revision FY 06 (will be renumbered [FM 3-11.100]).
FM 9-20	Technical Escort Operations	3 Nov 97	An Army-only manual which provides the suggested doctrinal TTP for the employment of technical escort battalions. **Current status**: Under revision FY 06 (will be renumbered [FM 3-11.20]).

NOTE: Current CBRN publications can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil/*> or at the USACMLS Doctrine Web site at <*http://www.wood.army.mil/cmdoc/index.htm*>.

Emerging Publications			
FM 3-11.23	Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives (CBRNE) Handbook for Installation Commanders	To be determined	An Army-only manual for installation personnel to plan for and respond to a terrorist CBRNE attack or incident against an Army facility. **Current status**: Under development FY 06.
FM 3-11.24	Chemical, Biological, Radiological, and Nuclear (CBRN) Handbook for Sensitive-Site and Hazardous-Site Assessment Operations	To be determined	An Army-only manual which provides the suggested doctrinal TTP for the conduct of sensitive-site and hazardous-site assessments by conventional Army chemical units. **Current Status**: Under development FY 06.

NOTE: To access CBRN draft publications, contact the Chief of the Doctrine Development Division at *ATSNCMDD@wood.army.mil* to request access instructions.

Nerve Gas

America's Fifteen-Year Struggle for Modern Chemical Weapons

By Mr. Reid Kirby

Chemical retaliatory plans during World War II called for using mustard gas (H) and phosgene (CG) aerial bombs (the most successful chemical agents used during World War I). Though scientists had discovered many new agents, these agents were generally extensions of the knowledge gained during World War I. For example, the British "secret weapon" of the time was high-altitude, aerial-spray attacks using runcol (HT), a mustard gas variant with a 60:40 mixture of H and O mustard (T). A revolution in chemical warfare was dependent on German development of nerve agents.

In 1936, at the German Leverkusen pesticides laboratory of I. G. Farben, Dr. Gerhard Schrader discovered tabun (GA).[1] The military utility of Schrader's discovery became clear when a single drop on a laboratory bench produced enough vapor to sicken him and a coworker. After performing a demonstration for the chemical warfare section, German army officials provided Dr. Schrader a laboratory at Wuppertal-Elberfeld in the Ruhr Valley to continue his work.

German scientists went on to discover sarin (GB), soman (GD), ethyl sarin (GE), and cyclohexyl sarin (GF). In 1939, GA was manufactured in a pilot plant at Munster-Lager. By 1942, there was also a production plant in Dyerfurth-am-Oder and another plant under construction.

The Chemical Warfare Service (CWS) may have known of the German interest in nerve agents as early as 1941. The United States investigated similar compounds, notably phosphorus (III) fluoride diisopropylflurophosphate (PF3), but concluded that they were only usable as eye irritants. In 1943, the British interrogated a German chemist who had firsthand knowledge of sarin. The Germans wrongly interpreted British censorship of pesticide research as an indication that the Allies were aware of the nerve agents. However, the secret of German nerve-agent research was not apparent until the Allies began to overtake German chemical dumps in April 1945.[2]

The Chemical Corps continued to study nerve agents and create more analogs after World War II. A national effort to create an arsenal with nerve agents did not receive priority until the Stevenson Ad Hoc Committee and the Korean War. Another impetus was the decision by the Air Force to be completely capable with chemical and biological weapons by 1954.

GA: The Interim Nerve Agent

Chemical warfare plans for the European theater depended on a chemical arsenal located in England. Within 24 hours, Army Air Force units could conduct attacks on tactical and strategic targets. Although these plans initially called for large-scale strategic employment, by September 1944 the Allies had scaled back plans to include only immediate tactical support for the Normandy invasion.[3]

The retaliatory plans for the Pacific theater were more problematic. Despite requests from the CWS in the mid-Pacific, appropriate stocks were not located closer than the California coast. This meant a retaliatory response time of 30 to 60 days. More importantly, plans for chemical retaliation against Japan called for quantities of chemical weapons that were not available. A survey of the zone of interior (Asiatic-Pacific and European-Mediterranean theaters) showed that only 855,000 persistent and 271,000 nonpersistent bombs were available. The retaliatory requirements against Japan called for 5,181,000 persistent bombs and 776,000 nonpersistent bombs. The CWS believed that the German arsenal could fill the gap and embarked on a crash program to evaluate the utility of these weapons.

The United States had captured 23,000 tons of GA in aerial bombs and 6,000 tons in 10.5-centimeter projectiles. The Army Air Force could deliver the aerial bombs without modification, but the 10.5-centimeter projectiles were too wide for Army 105-millimeter artillery. The CWS sent 3,000 tons of aerial bombs and 5,000 tons of projectiles to Edgewood Arsenal, Maryland, for further evaluation.

The German ordinance was punched and drained at Edgewood Arsenal to evaluate GA in the 4.2-inch mortar rounds and the M70 (E46) aerial bomb. Field trials showed that standard bursters were too small to disseminate GA

due to the low volatility of the agent. Only 10 to 20 percent of the agent was dispensed as aerosol or vapor. Furthermore, the CWS initially believed that the LCt_{50} (median lethal dosage) of GA was about 800 milligram-minute per cubic meter (mg-min/m^3). The conclusion was that GA was useful for harassment but was not suitable for chemical retaliation.[4]

During the Cold War (1950s), the British believed that the Soviet Union had standardized the use of GA. The United States estimated the Soviet stockpile at about 18,000 metric tons of GA in 1952, in addition to about 120,000 tons of older chemical munitions. The implications that Germany's nerve-agent production facilities and scientists had fallen into Soviet hands at the end of World War II was not lost on anyone.[5]

Replying to a request from the Commander In Chief of the Far East for a chemical capability by 7 June 1952, the Joint Chiefs of Staff stated that it would provide World War II vintage chemical weapons within six months and newer chemical weapons (such as nerve agents) after 1954.[6] When the Far East Air Force requested guidance on chemical employment against North Korea in January 1953, the discussion was exclusively on using World War II weapons containing CG, cyanogen chloride (CK) (a blood agent), and mustard gas, with particular interest in CK to penetrate protective masks.[7]

In November of 1952, Air Force officials at a GB aerial spray trial at Dugway Proving Ground, Utah, observed 2,171 German aerial bombs. The Army reported that 60,000 to 70,000 more bombs were stored at Rocky Mountain Arsenal, Colorado. Though surprised by the discovery, Air Force officials immediately came to the conclusion that GA needed consideration until GB became readily available.[8] By January of 1953, weapon systems intended for GB were being field-tested using GA. In the opinion of a veteran F80 pilot who participated in a field trial with GA in M10 and E28 spray tanks, the GA-filled E28 would have been suitable for use in Korea. It was also planned to use GA-filled E101 cluster bombs on a square-mile target at Dugway Proving Ground during the Air Force portion of Exercise Shorthorn.

By June 1953, the Far East Air Force was to receive 400 tons of GA weapons and World War II vintage chemical weapons for use as chemical retaliation. In the end, the chemical weapons remained stateside to avoid complications with the truce negotiations in Korea.[9]

GB: The Standard Nonpersistent Nerve Agent

Though GB and GD are relatively comparable in terms of toxicity, the physical properties of GD make it superior in penetrating the lungs and skin. GD requires pinacolyl alcohol—a chemical not widely available until the personal computer boom—as a feedstock. The Chemical Corps standardized GB in 1948, but research continued on GD and GH as potential replacements.[10]

The Chemical Corps, after erecting a pilot plant at Edgewood Arsenal in 1948, decided to manufacture GB at two locations. The critical component of GB—dichlorophosphinate (dichloro)—was manufactured in a regular mustard gas reactor at the Muscle Shoals Phosphate Development Works (Site A), located at the Tennessee Valley Authority Wilson Dam, Alabama. The dichloro was then sent to the Rocky Mountain Arsenal (Site B) for a two-step production process, distillation, stabilization, and munitions filling.

The construction of production facilities progressed slowly from 1951 to 1953. The Air Force expedited materials to provide assistance, at one point airlifting air filters from Andrews Air Force Base, Maryland, to Lowery Air Force Base, Colorado. There were also process hurdles to overcome. GB is a penetrating liquid, and finding the proper means to seal the fill plug on the weapons proved difficult. Stability was a lingering issue. Double-distilled GB proved too deleterious to the aluminum bomblets of the Honest John warhead. The problem was eventually solved by the addition of the stabilizing agent tributylamine, and later with diisoproplycarbodiimide.

The Air Force favored the use of GB over tactical nuclear weapons against Soviet aggression. Mobilization requirements assumed that 25 percent of sorties in the first month and 5 percent of sorties thereafter would employ GB in a war in Europe. These requirements were well into the tens of thousands of tons. When the British requested 2,500 tons of GB in 1953, the Joint Chiefs of Staff rejected the request, noting that production was insufficient for mobilization due to a scarcity of the mineral fluorspar (0.483 pounds of fluorspar is required per pound of GB).[11] The Chemical Corps produced GB from 1953 to 1957. In July 1957, the Muscle Shoals Phosphate Development Works terminated operations. A month later, the Rocky Mountain production facility also closed. The United States had acquired a stockpile of GB that it believed would be necessary for any future conflicts.

VX: The Standard Persistent Nerve Agent

Mustard gas remained the standard persistent, casualty-producing agent long after World War II, even after the standardization of GB. Though the Air Force believed that World War II munitions were not suitable for agent use, the Army contended that they had a requirement for tactical air support with a persistent agent. The Air Force, recognizing the power of GB, wanted a

persistent G-series agent. The Chemical Corps recommended GF. The Air Force was interested in aerial spray tanks with GF if it proved to be superior to GB for a skin effect and was more persistent than mustard gas. Some alternate possibilities included GB, GB-GF combinations, and 2-methyl GF. The Air Force asked the Chemical Corps to evaluate the persistency of GF in field trials. The Chemical Corps, wanting to avoid building another pilot plant, compromised with the Air Force on laboratory-scaled experiments.[12] The Air Force believed GF would provide them with the capability to attack enemy air bases. Calculations by the Air Force Directorate of Requirements concluded that the tonnage required for mustard gas or GF eliminated the possibility, unless there was a "miracle" chemical agent on the horizon. The prospects for a persistent, air-delivered, casualty-producing agent did not look promising.

The "miracle" came in 1953 when British chemical warfare researchers shared information on a new class of nerve agents. Doctors R. Ghosh and J. F. Newman from the British chemical conglomerate, Imperial Chemical Industries, discovered a new class of agents. Their discovery made its way through British chemical warfare researchers to the Chemical Corps, and in 1955, a new series of agents was termed *V* for venom. These agents were hundreds of times more potent than G agents for a liquid skin effect and several times more toxic for an aerosol lung effect. And the V-series agents were far more persistent than mustard gas.

The Chemical Corps began investigating new candidate agents. But stability was a problem and affected the ability of the agent to penetrate clothing. Initially, the Chemical Corps decided to pursue O-ethyl S-(2-diethylaminoethyl) ethyl phosphonothiolate (VE) as a persistent nerve agent and work on improving the stability of these agents with additives. O-ethyl-S-(2-diisopropylflurophosphate) methyl phosphonothioate (VX) later became the focus agent of the V series and, in 1958, became the standard persistent nerve agent. A pilot plant was erected at Edgewood Arsenal that same year; a production facility was constructed in Newport, Indiana, in 1960; and VX was produced and placed in munitions between 1961 and 1968.

The Next Wave

The introduction of nerve agents ended the dominance of World War I chemical warfare agents. The standard nonpersistent agent, CG, was replaced by GB. The standard persistent agent, mustard gas, cowered under VX. By 1960, the United States had finally devised the means to produce the modern chemical weapons it sought to replace its World War II arsenal.

But the potency and lethality of the nerve agents led to concerns over safety in transport and storage. Just as the Chemical Corps started to acquire its nerve-agent arsenal of GB and VX, the military establishment began to demand safer binary weapons. Around the same time, another series of nerve agents, the GV series, was maturing. But its extremely poor stability also required binary technology. Unlike the first fifteen years of the Cold War, the political climate of the 1970s and 1980s delayed the replacement of these unitary nerve-agent weapons. When binary weapons became available 30 years later, disarmament agreements mandated the destruction of the entire chemical arsenal.

Endnotes

[1]Tabun was originally called taboon. The military symbol was originally G, and GA was used for tabun doped with chlorobenzene.

[2]An overview of the early history of the nerve agents can be found at <*http://www.mitretek.org/home.nsf/homelandsecurity/HistoryNerveGases*>, accessed on 30 January 2006.

[3]National Archives RG331, Entry 276J, Box 140, File CWS/373.2/1, "Chemical Policy."

[4]Reid Kirby, "The CWS Efforts to Obtain German Chemical Weapons for Retaliation Against Japan," *CBIAC* Newsletter, Vol. 5, No. 1, Winter 2004, pp. 3 and 13.

[5]British Joint Intelligence Committee memorandum JIC 156/11/D, George Washington University, National Security Archives, CBW Collection, Box 2, Miscellaneous British Archive Documents File.

[6]Joint Chiefs of Staff memorandum JCS 1837/46, "Overseas Deployment of Toxic Chemical Agents," 12 March 1953, George Washington University, National Security Archives, CBW Collection, Box 12.

[7]The Air Force requested guidance on the use of chemical weapons against communist forces equipped with 45,000 gas masks, particularly the appropriateness of figures in FM 3-6 (1946) as applied to North Korea. See memorandum from MG Howard Bunker, USAF Assistant for Atomic Energy, to Chief Chemical Officer, Department of the Army, "Protective Equipment of Enemy Forces in North Korea," 30 January 1953.

[8]LTC George Criss, USAF BW-CW Division, "Dugway GB Spray Test," memorandum for record, 25 November 1952. BG Alonzo Drake, USAF Chief of Staff to USAF Deputy Chief of Staff–Operations, "Chemical Warfare Capability," memorandum, TAC AAG Reg. No. 52-1538, 10 December 1952.

[9]NARA FAEF briefing.

[10]CCTC Item 1890 "Classification of Quick-Acting, Nonpersistent Agent GB, as a Substitute Standard Type," 19 May 1948.

[11]Referenced in JCS 1837/47.

[12]Memorandum, Dr. Herbert Friedlander, USAF Chief BW-CW Agents Section to COL Seiler, "GF Requirement for ISCC September Meeting," memorandum, 11 September 1952.

Mr. Kirby is a project manager for TALX Corporation. He holds a bachelor's degree in valuation science from Lindenwood College, with a minor in biology and special studies in behavioral toxicology and biotechnology.

Cutting Edge Techniques for Conducting Chemical Lane Training Exercises

by Master Sergeant Russell E. Gehrlein

As a senior NCO, I have seen a variety of approaches to unit chemical, biological, radiological, and nuclear (CBRN) training. There are some good ideas out there, but there are also some not-so-good ideas. A challenge that all chemical trainers face is getting an event on the training schedule, keeping it there, and executing that training to standard. Lane training is a time-tested technique that commanders can use to bring intense training resources together and focus on selected tasks. It is an extremely effective tool when used with CBRN collective tasks at platoon or company level.

As an Active Army chemical observer-controller/trainer (OC/T) assigned to an Army Reserve training support battalion in the 91st Division (Training), I had the opportunity to plan, prepare, and execute more than fifty chemical lane training exercises (LTXs) with a variety of Army Reserve and National Guard combat support (CS) and combat service support (CSS) units. Over a four-year period, I conducted LTXs on platoon smoke and operational decontamination, company level react-to-chemical-attack missions, regimental CBRN staff operations, and chemical company decontamination and reconnaissance. Most of this training was conducted in the spring of 2003, before several Reserve Component (RC) units were mobilized to deploy to support Operation Iraqi Freedom. I also had the opportunity to conduct two react-to-chemical-attack LTXs with my brigade headquarters company the following year. I presented some initial observations and suggestions on planning chemical LTXs in the January 2001 issue of *Army Chemical Review*, "Chemical Lane Training Exercises: Essential Planning Considerations." (See Web site <*www.wood.army.mil/chmdsd*> to request archived articles.)

However, for this article, I will place more emphasis on mission execution. I will share what our team used to make chemical training realistic, how OC/Ts accomplished their mission with the supported unit, and what lessons were learned along the way so that scenarios can be repeated instead of recreated in future exercises. I hope that chemical trainers will find helpful techniques to carry forward in their training exercises.

Platoon Smoke/Decontamination Operations

One of my first missions during this assignment was to work with the organic chemical platoon (smoke/decontamination) of one of the National Guard's enhanced separate brigades. As an OC/T, I was a trainer and an evaluator during the platoon's annual training (AT). This platoon had just received renovated mechanized smoke generator systems. It had not yet used the new equipment for collective training when it received a mission to provide smoke support for two armor battalions and an infantry battalion during a ten-day field training exercise (FTX) in a harsh desert environment. The platoon's missions included providing on-order, mobile screening smoke during an armored movement and stationary obscuring smoke for task force breaching operations.

The mechanized smoke operations—major multiechelon training events—both went well. It was great to see an armor brigade taking rehearsals seriously. They had CS and CSS elements with them during rehearsals, to include engineer assets and a smoke platoon. Being a part of the planning and preparation process with the supported unit also helped the smoke platoon earn a "thumbs-up" on the mission. As an observer, the only suggestion that I made was to add more in-depth internal rehearsals using terrain models.

The one tricky part of the whole process was the placement of the OC/Ts during the mission. We saw two options: place the OC/Ts inside the smoke track itself or direct the observation from a specific vantage point. In the first option, I was positioned in one track and my partner was positioned in the other. We were able to view the teamwork that took place and take good notes from start to finish. The second option, vantage point observation, was conducted during the lane-breaching demonstration.

After two summers of smoke operations, the chemical platoon had the chance to support decontamination operations. And it excelled in the execution phase as expected. However, the platoon really made its mark in the meticulous planning and preparation phases. The day before mission execution, the platoon sergeant conducted a detailed rehearsal

with his Soldiers. But he also went one step further and arranged a combined rock drill with the armor battalion. He not only talked through the vehicle wash down and mission-oriented protective posture (MOPP) gear exchange from start to finish, but he also had the drivers and vehicle commanders from each vehicle walk through a scaled-down version of the decontamination site, move through each station, and state their actions so that all would know what to do and where to go. This effective rehearsal technique was, no doubt, instrumental to the nearly flawless mission execution conducted at combat speed and in MOPP 4 gear the next day.

Lane-breaching demonstration

React-to-Chemical-Attack LTXs

Before I describe in more detail what a good, effective react-to-chemical-attack LTX looks like, here's what it **does not** look like. Near the end of my first AT in the Idaho desert, I was invited to witness the following: Two nonchemical OC/Ts arrived at the support battalion headquarters field site and stated, through their actions, that they would just "throw some CS grenades and see how they do!" There were no training and evaluation outlines (T&EOs), no realistic scenario, no rehearsal, not much of an OC/T coverage plan and, in my opinion, no legitimate LTX. A year later, I offered our services to create a better training event. After executing this type of LTX more than twenty times on weekends and during AT, our team had the standing operating procedures down to a science. Thorough planning is always the key to success!

In a nutshell, here is how our team executed a react-to-chemical-attack LTX. Prior to the event, all coordination with the training unit was complete, the OC/Ts were well trained, a realistic and doctrinal scenario was set, intelligence reports and chemical downwind messages (CDMs) had been forwarded, and a rehearsal was conducted. The time had come to throw the switch on the M22 automatic chemical-agent detector alarm (ACADA). My OC/Ts watched Soldiers and leaders to ensure that they donned their masks properly before giving the signal to go to MOPP 4 status. They assessed a few "casualties," primarily with untrained Soldiers and Soldiers suffering from claustrophobia. I placed myself at the battalion tactical operations center (TOC) and watched for a size, activity, location, unit, time, and equipment (SALUTE) report to go to higher headquarters. I observed teams for the M256 chemical-agent detector perform tasks using real time. OC/Ts took safety precautions by directing Soldiers to drink from their canteens while in MOPP 4 to maintain hydration. After the agent was properly identified, I received the nuclear, biological, and chemical (NBC) 1 report, waited a few minutes, and then forwarded an NBC 3 report. After the expected time of contamination had passed, the unit leaders requested permission to conduct unmasking procedures. When we received the "All clear," we sent the information to higher headquarters with a request to unmask Soldiers. Thirty minutes later, we conducted an after-action review (AAR) with key leaders.

Reflection on Rehearsals

Rehearsals are vital to a successful LTX. Rock drills, sand tables, and talk- and walk-throughs enable leaders and Soldiers to visualize their individual roles and how they must work together as a team. The training unit should conduct its own rehearsals, with the OC/Ts in attendance and providing support. OC/Ts must observe the unit's planning and preparation operations and make suggestions or corrections, coach unit leaders regarding the necessity of a rehearsal, and provide checklists prior to the mission execution. And the rehearsals also serve as a prime time to train the trainer.

The rehearsal can be conducted anywhere from a few hours to a half day before a mission. For a dawn attack, the unit might rehearse in the afternoon of the day before to give supervisors time to conduct precombat inspections on personnel and equipment (especially MOPP gloves and M1 canteen caps). For an LTX, the unit CBRN NCO might want to mention the intelligence reports already received; talk through the required individual actions before, during, and after the attack; and refresh the Soldiers' knowledge on common tasks such as MOPP levels, nerve-agent antidote, self-aid and buddy aid procedures, skin decontamination, and canteen drinking procedures. Hands-on practice is also a good idea.

Additionally, rehearsals are a natural opportunity to focus on the safety and risk management processes. Units need to look at real-world safety issues and potential combat implications. During any training exercise involving Soldiers moving while wearing protective masks, the obvious real-world safety hazard is limited visibility. One control measure is to have the Soldiers remove the gray eye lens outserts and replace them with clear lenses (unless there is a danger of snow blindness). Exposed skin also presents a safety hazard. In a training exercise, there are limited or no consequences; but in an actual chemical environment, casualties could occur.

Some of the essential training ingredients mentioned in my previous article included:

- ✓ The T&EOs for each battle-focused collective task selected from the unit's ARTEP manual and the supporting individual tasks from the CTT manual must be current. The OC/T team and the training unit must have the same tasks before execution.
- ✓ The scenario OPORD or intelligence annexes must refer to the enemy's NBC weapons capability; the initial MOPP level should be stated in the coordinating instructions.
- ✓ A timeline for a dawn or dusk attack must be realistic and should include designated times for sending NBC intelligence spot reports and CDMs; conducting rehearsals, rock drills, and AARs; and performing retraining exercises (if necessary).

An observation plan should cover the placement of OC/Ts and be designed to observe as many Soldiers and leaders as possible to execute the task and assess casualties or prompt follow-on actions.

Synchronized Chemical Company Training

My senior chemical OC/T and I were tasked to provide training support to a new National Guard chemical reconnaissance/decontamination company in Montana. We assisted this company during two complete AT cycles. We provided officers and NCOs with guidance during the planning process and prepared and executed a series of chemical LTXs according to the commander's training objectives. That summer, for its first formal training assessment model (TAM) evaluation, the company went from a "U" (untrained) in its mission-essential task list (METL)-related collective tasks to a "T" (trained) in several and a "P" (needs practice) in some, despite the short time to prepare. The company earned assessments by meeting stringent standards. And we gained great satisfaction from watching them succeed!

One of our keys to success for training this unit was obtaining a clear picture of its wartime mission. The chemical company had an organic CBRN staff section capable of providing 24-hour manning to monitor the CBRN Warning and Reporting System (CBRNWRS) at a regimental headquarters. It also had a decontamination platoon, a reconnaissance platoon, and a company headquarters. Each element had its own separate Army training and evaluation program (ARTEP) manual. We used all four manuals to determine which collective tasks were required to accomplish various missions. A chemical attack in sector drives the regimental chemical section to use the CBRNWRS, which would generate an order for the chemical company to conduct a chemical survey (or a decontamination mission) to send the respective platoons into action. We carefully designed a robust, day-by-day scenario, which included a variety of missions to give the entire company purpose, direction, and motivation. All of the events were synchronized and contained the following challenging scenarios:

- Day one—a nontactical move to the staging area.
- Day two—a tactical road march and the set up of a forward assembly area.
- Day three—three days each of operational decontamination and chemical reconnaissance LTXs (following the crawl-walk-run methodology) (there were only enough Soldiers for one line platoon at a time).

Regimental Chemical Staff Operations

After our initial visit in January 2001, we came back three months later, prepared to put the staff element through a CBRN mini exercise to see how well it could accomplish its collective tasks to standard. We asked the regimental CBRN officer to break down his section into two teams—a day shift and a night shift. In four hours, we compressed the activities of two 12-hour shifts. We threw in synchronized realistic challenges (including CDMs, CBRN intelligence reports, and personnel and equipment shortages) and increased the operational tempo by adding multiple NBC reports delivered simultaneously. The staff officer in charge (OIC) (or noncommissioned officer in charge [NCOIC]) was also required to brief the notional regimental commander. The AAR showed that the element met most of its tasks to standard. The exercise proved to be great preparation for the AT that followed a few months later.

There were seven or eight tasks from the ARTEP manual that were trained during the element AT including: maintain the current situation, plan chemical unit employment, process CBRN reports, and prepare contamination predictions. We still used the crawl-walk-run method, but these Soldiers were all fast crawlers, so they picked up the pace quickly. Our job as OC/Ts was a complex one, particularly with scenarios outside the continental United States (OCONUS). Acting as the higher headquarters, we began by sending the element numerous CDMs, intelligence reports, and equipment status reports from notional chemical units to get it focused and prepared. When the time was right, we sent the first NBC 1 report. The first two attacks were out of sector, and we expected the element to initiate a MOPP analysis and then prepare to execute the CBRNWRS. The regimental commander required briefings at set times and whenever the situation changed. After the chemical attacks were plotted in sector on the graphic overlay and the situation map, a decontamination (or reconnaissance) platoon mission was generated. This was repeated for three days (three days for each type of mission). When the element was ready to send a mission operation order (OPORD) to the chemical company, the exercise scenario was substituted with real-world training coordinates so that the company could replace its scenario grid coordinates with those it received. One OC/T observed the company and then observed the platoon to view its planning, preparation, and execution mission; the other OC/T stayed with the regimental chemical section. When the mission was complete, we conducted an AAR with the company headquarters and line platoon, followed by a separate AAR with the regimental chemical section. Although the exercise sounds difficult, it worked well after everyone adjusted to the technique.

We had predicted that this element would run long completing its AT, so we preplanned a chemical attack on its location the last day of the formal evaluation to force the use of MOPP 4 gear. To assist with the AAR, we had a video camera running when the message traffic was received. When the computer plotter put a dot on the map on the element's location, "It's on us!" could be heard and a scramble could be seen. Needless to say, the element still performed extremely well, despite one "casualty," and briefed the regimental commander before we gave them the anticipated "All clear!"

Moonlight Decontamination

One of the advantages of a summer FTX is the added daylight of the long days and the opportunity to run into the evening hours, if necessary. In all my years of decontamination experience, I cannot remember ever conducting a decontamination operation in the dark. It seemed logical that if there was a dusk chemical attack, a follow-on decontamination operation would need to be conducted long after the sun went down. We scheduled such an event for our second AT with the chemical company and found it to be a unique, positive experience. The simulated chemical attack was on a transportation battalion headquarters that was colocated with the chemical company. "Team Dragon" provided OC/T support on the attack lane and then shifted gears after the AAR to observe the supported operational decontamination mission executed by the decontamination platoon. From our lessons learned earlier that summer, we ensured that the decontamination platoon sergeant conducted a two-pronged approach to rehearsals—with the platoon and the soon-to-be-contaminated unit. Since the operation was to be conducted at night, additional safety and security concerns were also addressed. The training event had some challenges from an OC/T perspective, in that it was hard for the team to observe all of the events. Even with the difficulties, it turned out to be a well-executed event.

Reconnaissance Lanes

Other than a few weeks as an OC/T augmentee with an OCONUS divisional Fox platoon, I had not spent much time around chemical reconnaissance units. But my limited experience did not hinder our team in assisting this chemical company during its first AT; we just needed to study the reconnaissance field manual. However, we were surprised to find that RC units did not have Fox reconnaissance vehicles; they had high-mobility, multipurpose wheeled vehicles (HMMWVs) with M8 paper on a stick. We had to come up with our own technique for evaluating this platoon as it conducted its mission. We definitely had to think outside the box on this one.

To make this training realistic, there were two immediate problems we needed to solve. One was to give the platoon a clearly defined and reasonably sized piece of land to conduct its survey, an area to complete an NBC 4 report, and a means to send information to the regimental command to be plotted on an overlay. We could not use liquid simulants on the ground. After locating a training area that would give the company a chance to train on its mounted, tactical-movement techniques in MOPP 4, we drew a hasty diagram of the contaminated area (about 200 by 300 meters) between easily identifiable terrain features (such as a road junction, tree line, or big rock). When the platoon

arrived at the training location and began to conduct its survey, we faced our second challenge: how to communicate contamination identification to the Soldier holding the M8 paper taped to the stick. Again, there were two options: ride in a vehicle alongside the Soldier or stand in a central location and communicate using a radio or hand signals. We tried both methods with even results. When the platoon executed its area survey on the last day of reconnaissance, it was a sight to behold. They performed a picture-perfect survey using the lane search technique with two vehicles in an open field. It looked just like the diagram in the field manual.

Conclusion

With all the things that chemical Soldiers must do, training must be one of the highest priorities. A chemical LTX is a great idea that really works if done properly. To be effective, there must be a doctrinal, realistic, challenging, and creative plan in place. The OC/T and unit training personnel must be equipped with the tools they need to succeed in earning a "T" in collective CBRN tasks.

References

Field Manual 3-11.19, *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Reconnaissance*, 30 July 2004.

Training Circular (TC) 25-10, *A Leader's Guide to Lane Training*, 26 August 1996.

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("Transforming Decontamination Doctrine . . ." continued from page 39)

decontaminate it. Soldiers will enter a decontamination area with full gear, exit with nothing, and move to an issue point for new gear (including weapons). Units can speed up the decontamination and restoration process with additional support from combat support and combat service support units. Chemical companies will remain the main source of additional power-driven decontamination systems and decontaminants. Logistical units will provide the new equipment and supplies necessary to reconstitute a unit to full capability. Transportation units are required to transport equipment decontaminants to the decontamination area. Armored vehicles and heavy equipment require manpower to open hatches and remove materials not suited for decontamination. The goal is to clean every inch of surface material—inside and outside. Some sensitive equipment may need to be replaced with new or refurbished items. Monitoring for contamination will use the current generation of available sensors and detector papers. In the near future, increased sensitivity levels may require new detectors and methods of measurement not currently fielded to maneuver units. The risk following the mission is very low.

High-value or important equipment may require specialized decontamination procedures not performed at the unit level. For example, rifles and machine guns are generally made of metal but may have some plastic parts that must be removed for decontamination. If the plastic parts are removed, only the metal is decontaminated to a safe operational level. New plastic parts are replaced on the weapons before reissue. Even after decontamination, some items exposed to contamination may never leave the theater of operations or return to the home station with the unit. Some items or parts are disposed of as hazardous waste. Decontamination may render them useless or not prove to be cost-effective.

With the new approaches to extensive operational decontamination, the maneuver commander benefits from the measurable standards of cleanliness. Minimal operational decontamination frees the Soldier from the protective mask. Extensive operational decontamination provides the unit with clean equipment and vehicles but requires significant resources and time to accomplish. The issue is not, "Should we transform decontamination?" but "When do we begin the transformation process?"

NOTE: If you would like to comment on this article, its concepts, or the application process, provide an e-mail to *<ATSNTD@wood.army.mil>*.

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2005 Order of the Dragon Program Inductees

The following individuals were inducted into the Order of the Dragon Program (OODP) in 2005. The OODP is designed to maintain and enhance the legacy of the Chemical Corps and to promote cohesiveness and esprit de corps in the Chemical Corps Regiment by recognizing individuals who have served the Corps with distinction. The OODP consists of three awards: the Ancient Order, the Honorable Order, and the Carol Ann Watson Spouse Award. Nominated personnel must meet the criteria established for each level of recognition. Information concerning the OODP is available on the Chemical Corps Regimental Association Web site *<http://www.chemical-corps.org>*.

Ancient Order of the Dragon

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COL Rodney Alston	SGM Robert F. Davis	CSM Andrew L. Howard	1SG Leroy G. Mundy
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2006 Nominations for the Hall of Fame and Distinguished Member of the Corps Honors

Nominations are being accepted for the Chemical Corps Regimental Association (CCRA) Hall of Fame and Distinguished Member of the Corps honors.

- **Hall of Fame.** This award is extended to chemical personnel (living or deceased) who have spent their professional careers serving the Chemical Corps. Their service to the Corps must be extraordinary. For information on the nomination criteria and submission requirements for the Hall of Fame program, see Web site *<http://www.chemical-corps.org/honors/hof.htm>*.
- **Distinguished Member of the Corps.** This award is extended to living members who served the Corps in their professional lives and continue to serve it in their personal lives. Active Army military and current federal civilian personnel are not eligible for the program. The nominations are limited to personnel who have been retired for at least two years. For nomination criteria and submission requirements for the Distinguished Member of the Corps program, see Web site *<http://www.chemical-corps.org/honors/dmc.htm>*.

Nomination packets should be sent to:

Commandant
US Army Chemical School
ATTN: ATSN-CM-CS-H (Regimental Historian)
Fort Leonard Wood, Missouri 65473-8926

All packets must arrive by 1 May 2006. The selections will be announced not later than 15 June 2006. For more information, call (573) 596-0131, extension 37339.

I will always place the mission first. I will never accept defeat.
I will never quit. I will never leave a fallen comrade.

INCULCATING THE WARRIOR ETHOS

By First Lieutenant Nicholas Vujnich

The Army is currently fighting a war against terror that has led to conflicts in both Afghanistan and Iraq. This contemporary operational environment (COE) is far different than any ever seen before. Although in recent years the Army has operated in desert terrain and fought urban battles in hostile cities, doctrine, tactics, techniques, and procedures (DTTP) have not fully prepared the Army to face the current enemy. This enemy attacks with nontraditional methods that are constantly evolving due to the need to overcome varied US countermeasures. This continuous evolution renders the enemy exceedingly unpredictable. Additionally, the enemy is highly motivated and fully prepared to sacrifice lives to accomplish missions. Enemies live and hide among the general populace, nearly undetectable, and are able to move freely throughout the theater of operations until they are prepared to strike. They are determined, they are dedicated, and they are dangerous.

While US forces are preparing to move into theaters to face these new enemies, leaders must harden the troops against such opposition. While discipline, dedication, and determination are necessary for success and survival in any military environment, these attributes are particularly vital for Soldiers sent to combat in the COE. Soldiers must go to war inculcated with a Warrior Ethos that not only protects them from danger but also equips them with the attitude and mental preparation necessary to overcome the enemy.

The Warrior Ethos may be described in many ways; however, a single Army creed captures the essence of the Warrior Ethos. The creed simply contains four clear, concise statements: "I will always place the mission first. I will never accept defeat. I will never quit. I will never leave a fallen comrade." This creed sums up what the Army expects regarding the actions of a Soldier, and it provides a solid foundation for discussions about how to instill Soldiers with the Warrior Ethos.

There are many great Soldiers in the Army. Unfortunately, there are also Soldiers who do not demonstrate the Warrior Ethos. Some make excuses for why assigned tasks are not completed, when the fact is that they just do not place the mission first. Some say that they do not know how to complete a particular task—perhaps believing that accepting defeat is easier than searching for the answers needed to do the job correctly. Every morning at physical training, there are Soldiers who fail to meet the daily standards set by the instructor. Responsibility for these failures is sometimes avoided by using justification related to unrecorded injuries, excessive difficulty of exercises, or overworked muscles resulting from time spent at the gym the night before. The real truth is that some Soldiers just do not want to work any harder, so they choose to quit rather than put forth more effort.

Soldiers who do not live by the creed when facing the day-to-day stresses of a garrison environment are unlikely to do so when faced with the dangers presented by combat. Therefore, leaders must take every opportunity to properly prepare Soldiers for various situations they may face. The foundation for this preparation is the creation of an attitude that places the mission first, never accepts defeat, never quits, and doesn't leave fallen comrades behind. Behaviors and attitudes that fail to demonstrate the Warrior Ethos cannot be condoned.

The first step in inculcating Soldiers with the Warrior Ethos is to hold them responsible for their actions. Leaders must not allow Soldiers to accept defeat or give up the mission. Soldiers must be forced to adopt a hardened attitude at all times. Only with this attitude, will they be prepared to take the next step.

Once a hardened attitude is adopted, Soldiers must begin learning the technical and tactical skills which will prepare them to defeat the enemy. The ability to shoot, move, and communicate is essential to a Soldier's effectiveness in combat. Marksmanship is widely accepted as the most vital of these tasks, yet not all Soldiers are able to qualify on assigned weapons systems. One of the most fundamental duties of any unit should be to ensure that Soldiers are able to accurately engage the enemy. According to Field Manual (FM) 3-22.9, "The procedures and techniques for implementing the Army rifle

marksmanship training program are based on all Soldiers understanding common firing principles, being proficient marksmen, and being confident in applying their firing skills in combat."

After the fundamentals of marksmanship have been mastered, a Soldier's skills must be advanced beyond the basics necessary for the qualification range. FM 3-22.9 details programs that focus on skills such as advanced firing positions; combat firing techniques; chemical, biological, radiological, and nuclear (CBRN) firing; unassisted night fire; moving target engagement; short-range marksmanship (SRM) training; and squad-designated marksman (SDM) training. Mastery in these areas establishes a skill set that reinforces the concept of Warrior Ethos among Soldiers. Soldiers who master these skills will be adequately prepared and will have the confidence necessary to seamlessly act against the opposing force during combat.

The ability to maneuver in the combat environment is another of the most important aspects of war. Maneuverability affects all levels from divisions of combat forces all the way down to the individual on the ground. After the enemy has been engaged, Soldiers must apply the basic fundamentals of maneuver operations to overcome the opposition. They must also be taught to properly seek cover and concealment to effectively protect themselves while preparing to return fire. Every individual on the battlefield should be familiar with troop-leading procedures and have a working knowledge of the battle drills necessary to respond to enemy attacks with deadly force.

To successfully engage the enemy and maneuver to overcome them, individuals and their elements must be able to effectively communicate on the battlefield. Soldiers must be trained and fully capable of conducting various communication tasks required of them while under attack. Every Soldier entering the COE should fully understand his unit standing operating procedures (SOPs) for communicating air combat element (ACE) reports; size, activity, location, unit, time, and equipment (SALUTE) reports; and situation reports (SITREPs). Each Soldier must also be able to competently communicate nine-line medical evacuation (MEDEVAC) requests and improvised explosive device (IED) reports. A Soldier's ability to relay timely and accurate information plays a significant role in the provision of lifesaving medical treatment and the support of quick-reaction forces (QRFs) to aid with an offensive reaction to the attack. Solid communication skills help to build the confidence that Soldiers need to react to any situation, including chaotic situations that will surely occur. This confidence is a large part of the Warrior Ethos.

In the COEs of Afghanistan and Iraq, forces generally operate in a tactical defense that supports the strategic offense. Strategically, this is a war of resource attrition in which the ability to conduct tactical defense and survive in combat wears on enemy resources. Although some forces in theater actively seek out and destroy the enemy and its resources, the majority conduct support operations with emphasis on tasks that protect the force. Survivability in theater helps maintain national support on the home front, which is a factor that cannot be ignored in the effort to achieve victory.

Because Soldiers primarily operate in tactical defense, much of their current training is focused on the skills necessary for protection in a combat environment. The training does not emphasize the fact that the tactical defense is only an operational pause used to set the conditions for transition to the offense. Leaders must ensure that training instills in Soldiers the Warrior Ethos that, upon becoming a target, drives them to immediately transition from defense to offense. In short, Soldiers must be taught to conduct the simplest of warrior tasks—to defeat the enemy.

While survivability is key to success, triumph can be realized only by presenting a hardened presence in the face of the enemy. The opposition actively seeks soft targets that do not appear to be prepared to defend and, more importantly, are not ready to strike back after an attack. Empowering Soldiers with the skill set and mental fortitude necessary to defeat the enemy is the way to change the tide of a war.

The Warrior Ethos is more than just a creed or a set of values that can be spoken of in plain terms. The Warrior Ethos is a mentality, an attitude, and a way of reacting to chaos and confusion. In order for Soldiers to habitually think and react in an admirable manner, they must be taught the fundamental skill sets that allow them to fight with the Warrior Ethos. Therefore, leaders must ensure that training includes the components necessary to accomplish this goal. For their part, Soldiers must live by the creed and hold themselves to those standards; they must do all that is necessary to ensure that they never leave a fallen comrade.

Reference

FM 3-22.9, *Rifle Marksmanship M16A1, M16A2/3, M16A4, and M4 Carbine*, 24 April 2003.

First Lieutenant Vujnich is the assistant group chemical officer for the 1st Special Forces Group at Fort Lewis, Washington. He has a bachelor's degree in political science from Central Missouri State University, Warrensburg, Missouri.

Soldier Deploys to Pakistan for Earthquake Relief Mission

By First Lieutenant Clare Martinez

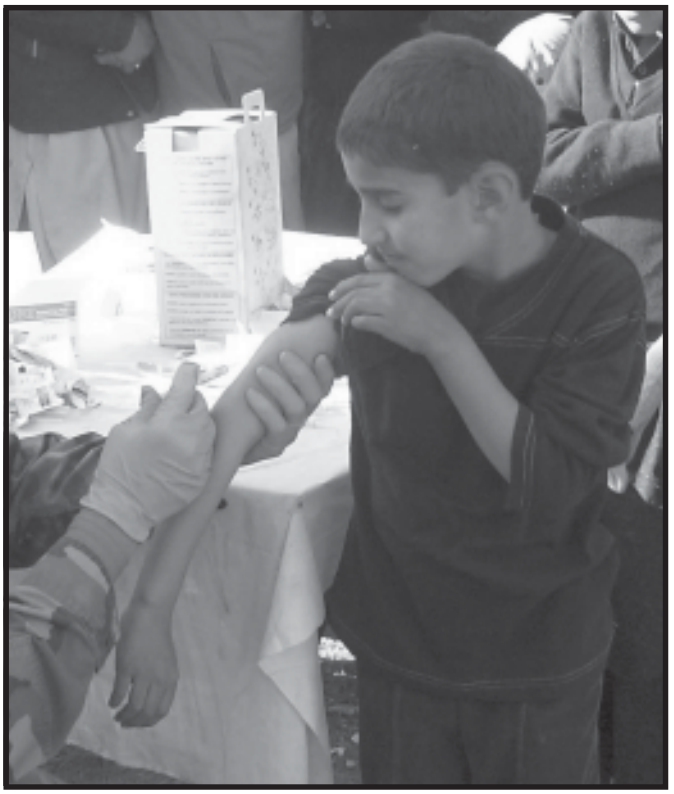
Outside the City of Muzaffarabad, Pakistan, a Soldier from the 22d Signal Brigade was asleep inside his vehicle, awaiting daylight so that he could help construct tents to house Soldiers from a unit he deployed to support. Staff Sergeant Syed M. Ahmed traveled to Pakistan, a country in ruins from a natural disaster, to assist the 212th Mobile Army Surgical Hospital (MASH) for 30 days during Operation Earthquake Relief.

Staff Sergeant Ahmed deployed to help bridge the language barrier that hampered communications between the Pakistani people and relief personnel. It was his ability to speak Urdu and communicate in Punjabi that provided the greatest assistance. Ahmed speaks five languages, including Hindi, Punjabi, and Pakistani "mountain language," but he sometimes found it difficult to communicate because many of the Pakistani people were old and, oftentimes, illiterate. Medical terms were especially difficult to translate. When patients visited doctors, Ahmed had to explain what was going to be treated and what the associated risks were. And there are just some English medical terms that do not translate to Urdu.

On day two of Staff Sergeant Ahmed's deployment, Soldiers built an emergency room and an intensive care unit, off-loaded trucks, and cleaned the new area. Much of the area was filled with litter, so everyone worked together to set up operations, stopping only to consume meals, ready-to-eat (MREs). Additionally, there was no fresh water. "We were under water ration for the first two days. We could [only] consume three bottles a day, even though we were working very hard and sweating," said Ahmed. The MASH team worked 24-hour days and required vigilant translator support with the local populace. "When we first got there [Pakistan], we didn't have cranes. We didn't have heavy forklifts. We didn't have the equipment to download what we needed [to make the hospital ready]. It was the translator's job to go get the cranes and forklifts and even the fuel we needed from [the] Pakistanis in order to provide medical support," said Ahmed. The MASH unit was up and running within 48 hours of arriving in theater.

Seven days later, although still sleeping on cots, Soldiers in the 212th MASH began to see a dramatic improvement in their quality of life. Water restrictions were lifted and, thanks to the creative carpentry efforts of US Navy Construction Force Seabees, wooden foot stands (for shaving), showers, latrines, and laundry facilities were constructed. Thirty-five days later, Soldiers were still eating food from a bag, but they were grateful for their MREs and their new accommodations.

The Soldier translators in Pakistan coordinated with many local officials, such as colonels, generals, and police inspectors general. According to Staff Sergeant Ahmed, the Pakistani police inspectors general are similar to police chiefs of small towns in the United States. Also, Soldiers often traveled to schools and other off-site locations on preventive-medicine missions. "If we found cases of meningitis, [the] translators had to find out which village they were from. We went with the medics to that village and gave medicine to that person's family and whoever



A young Pakistani boy receives an innoculation at the 212th MASH.

that person came in touch with within the last few weeks," said Ahmed.

Inside the city of Muzaffarabad, among the rubble and debris of earthquake ruins, a woman was found in a stream. She had leeches on her body and wore filthy clothing. No one knew what village she was from, and no one claimed her. "We don't know what happened," Staff Sergeant Ahmed said. "She was in shock. We had to release her once she was treated, but release her to where? This is where the translators come in. We had to coordinate with the Pakistani Army. They had a civilian agency like the Red Cross. We couldn't just let her go; she could have fallen from the mountain."

And it was that mountain that kept Staff Sergeant Ahmed and the 212th MASH from reaching Muzaffarabad on their first night. It was too dark and dangerous to drive along the mountainside. The advance party had already made it to the city, but the main body where Ahmed was, stayed outside the town. "While we were there [Muzaffarabad], two buses filled with people fell from the mountains that were above us. It seemed routine," Ahmed said. A jeep also fell from the mountain while he was there. In Muzaffarabad, many of the roads are gone and the streets are washed away. "It's very interesting. All the roads are above you. What looks like stars could be headlights," said Ahmed.

Despite the absence of roads, people walked from villages 40 to 100 kilometers away for medical treatment. According to Ahmed, some walked for two or three days to reach the MASH unit.

"What do you do with the people who plead with you to let them stay once they have already received medical treatment? Words just cannot show the emotion of people who are pleading. As a translator, how do you say [that] this guy doesn't have housing? He has no where to go. Words just can't convey the emotion," Ahmed said sadly.

First Lieutenant Martinez is a public affairs officer with the 22d Signal Brigade rear detachment. She has written several articles on Soldiers who have deployed in support of Operation Iraqi Freedom.

Museum Director Retires

Mr. H. Dale Durham, Director of the US Army Chemical Corps Museum, Fort Leonard Wood, Missouri, retired recently after 43 years of federal service. He served as the museum director from May 2001 to December 2005.

Mr. Durham served in the Air Force from 1961 to 1965. After completing his military service, Mr. Durham worked at Fort Sill, Oklahoma, as a training instructor and later as a museum curator. After transferring to the National Park Service in 1978, Mr. Durham served as Chief of Curatorial Services, Harpers Ferry Center, Harpers Ferry, West Virginia; Chief of Museum Services Division, Southeast Regional Office, Atlanta, Georgia; and assistant superintendent at the Amistad National Recreation Area, Del Rio, Texas.

Mr. Durham received his bachelor's degree from Cameron University, Lawton, Oklahoma, and attended classes in museum science at the University of Oklahoma. His primary professional interests are in museum management, historic preservation, and the study and interpretation of the Nation's patrimony through its material culture. He is the author of a book, numerous planning documents for the National Park Service, and several historical monographs and articles.

Mr. Durham plans to travel and to provide his consulting services to museums and the National Park Service.

Directorate of Environmental Integration Provides Support to the War Effort

By Mr. Al Vargesko

Disposing of used oil is a significant problem for a deployed Army. Estimates from the field show that the Army is generating 20,000 to 30,000 gallons of oil per week in Iraq. And the problem is exacerbated by the elimination of the Army Oil Analysis Program (AOAP). Even though there are contracts in place for the disposal of used oil, attacks on the convoys from insurgents are compounding the difficulty of proper disposal. Commanders have been forced to reduce or eliminate the transport of oil wastes. Stockpiling used oil is not an acceptable solution.

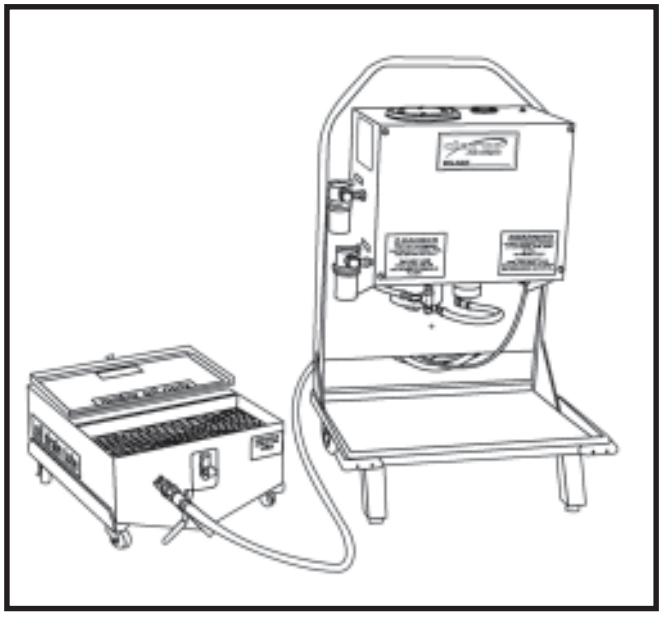
Used oil is normally handled eight times by Soldiers and/or civilians before disposal. This waste stream costs valuable time and money. But what if used oil could be eliminated as a significant waste to the Army? That is exactly what a team of Army environmental professionals at the US Army Engineer School, Directorate of Environmental Integration (DEI), asked themselves.

DEI's research turned up a fuel-oil blending technology as a potential solution. Mr. Kurt Kinnevan, a professional engineer and a division chief with DEI, found a potential solution with a piece of commercial, off-the-shelf (COTS) equipment called a *fuel-oil blender*. The oil change alternative technology (CAT) built by Clarus Technologies, LLC, blends used oil (from a vehicle oil change) with diesel or JP-8, filters it, and returns it to the fuel tank to burn as blended fuel. The innovative concept uses waste stream as a fuel, requires less handling, causes no degradation to engine performance, and meets Environmental Protection Agency (EPA) standards.

Fuel-Oil Blending Benefits

- The oil CAT reduces the time required to handle waste, resulting in a time savings for Soldiers.
- The process changes a waste stream into a useable fuel source.
- The oil CAT pays for itself in a short period of time. (The $3,000 price tag includes 10 filters, approximately one year of use.)
- The process was approved by the Tank Automotive Command (TACOM) during a contracted study in 1998.
- Guidelines in the Army Strategy for the Environment advocate zero footprint base camps for the future force—fuel-oil blending supports this goal.
- Fuel-oil blending can only be performed using oil drained from the crankcases of unit equipment.
- The vehicle emissions meet EPA standards when blended at 7.5 percent or less of the fuel tank contents.
- There is no degradation of engine life or performance.
- The oil CAT has a relatively simple construction and is easy to use.
- The replacement filters are the only recurring cost, but they must be handled as hazardous waste.

The system of fuel-oil blending has been used by commercial truck fleets for many years. One of the first uses of the oil CAT by the Army was at Camp Eagle, Bosnia, in 2004. According to personnel there, the system worked great. Personnel at Fort Drum, New York; Fort Lewis, Washington; Fort Campbell, Kentucky; and Fort Irwin, California, have also used the fuel-oil blending system. Mr. Kinnevan toured Clarus Technologies to inspect the facility, review the capabilities, and make recommendations to create a more user-friendly system for deployed Soldiers. Working closely with Central Command (CENTCOM), he helped draft an operational needs statement (ONS) for specific areas of operations. The ONS was endorsed by the Combined Arms Support Command (CASCOM) and the US Army Engineer School.



CAT fuel-oil blender

CAT blender in use

Mr. Vargesko is a doctrine, organization, training, materiel, leader education, personnel, and facilities (DOTMLPF) integration specialist with DEI, US Army Engineer School, Fort Leonard Wood, Missouri. Mr. Vargesko is a retired Army engineer officer. He has a bachelor's degree in geography from Indiana University of Pennsylvania and a master's degree in military art and science from the Command and General Staff College, Fort Leavenworth, Kansas.

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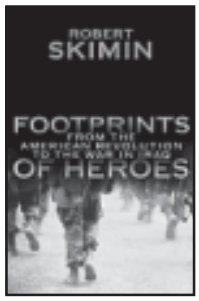
Book Reviews

By Mrs. Susan Groth



Footprints of Heroes: From the American Revolution to the War in Iraq, Robert Skimin, Prometheus Books, Amherst, New York, 2005.

"The word hero became practically a dirty word during and after the Vietnam conflict. The same was true for patriotism. Together the words were castigated and nearly removed from popular lexicon. Athletes and rock stars were presented as heroes, even if the most heroic act they ever performed was staying out of jail, maligning the true meaning of the word for our young."[1]

We live in a society that is inundated by the media and popular culture and—as a result—influences our personal, political, religious, and ethical beliefs. As Robert Skimin asserts in the above quote from his book, *Footprints of Heroes: From the American Revolution to the War in Iraq*, the media has also influenced society's image of the hero. Too often, the word *hero* conjurs an image of cultural idols. For many of our youth, heroes are measured by the number of albums sold or the number of sports records broken, not by the true measures of heroism—courage, honor, pride, responsibility, and most importantly, self-sacrifice. It took an infamous act—11 September 2001—to remind America that freedom is a gift that must be earned and appreciated, and with this reminder, the true image of the hero resurged. We were reminded that those who sacrifice themselves for our freedom every day, and who too often are forgotten or taken for granted, are the true heroes of our society—our firefighters, our policemen and, of course, our military heroes.

In his book, Skimin takes a unique look at military heroes throughout history, many of whom are unknown to most people. Through anecdotes and vignettes, Skimin tells the stories of the heroic acts of these military men and women. Skimin revisits the lives of our well-known heroes, such as George Washington, Ulysses S. Grant, Theodore Roosevelt, George S. Patton, Douglas MacArthur, Audie Murphy, and John McCain, just to name a few. And while it is important to know and be reminded of their accomplishments, the stories that stand out and overpower this book are the stories of the men and women whose names are not remembered or recognized for their heroic acts, such as the average Soldiers of the Revolutionary and Civil Wars, the farmers who put aside their responsibilities at home to take up arms for freedom, the drummer boys who beat cadence and orders in the Union Army, and the nurses who worked on the battlefields. Even Bob Hope, who brought laughter to American troops through every conflict from World War II to Desert Storm, is paid tribute in this book. Throughout military history, there have been thousands of unknown heroes who have put aside their personal needs in order to provide us with the freedom that we enjoy today—people without whom our well-known heroes and leaders would not be known. In the words of General Norman Schwarzkopf, "It doesn't take a hero to order men into battle. It takes a hero to be one of those men who goes into battle."[2]

If there ever was any question as to what defines a hero, *Footprints of Heroes* answers that question. Skimin—a former paratrooper, Army aviator, and artillery officer—presents American military history through the lives of its heroes. Although his story does not overlook the famous, it is mostly about the ambiguous, unknown fighting men and women of yesterday and today. It is a tribute to those who sacrificed for us, and it serves as a source of inspiration for us and for future generations of heroes.

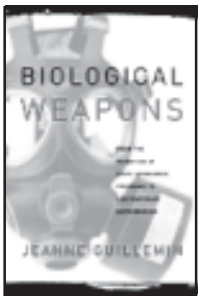
Endnotes

[1]Robert Skimin. *Footprints of Heroes: From the American Revolution to the War in Iraq*. Prometheus Books, 2005.

[2]H. Norman Schwarzkopf, Peter Petre, editor. *It Doesn't Take a Hero: The Autobiography of General H. Norman Schwarzkopf*. Bantam, 1993.

Mrs. Groth is an instructional design specialist Department of the Army intern, working with the Directorate of Common Leader Training, US Army Maneuver Support Center, Fort Leonard Wood, Missouri. A former contributing editor for Engineer, she holds bachelor's and master's degrees in English from Cameron University and is currently working on a master's degree in learning systems design and development from the University of Missouri-Columbia.

By Mr. Reid Kirby



Biological Weapons: From the Invention of State-Sponsored Programs to Contemporary Bioterrorism, Dr. Jeanne Guillemin, Columbia University Press, 2005.

Dr. Jeanne Guillemin (author of *Anthrax,* the 1999 book that dealt with the 1979 Sverdlovsk biological accident) wrote this book for those interested in the modern history of biological warfare. She found that many people, including military professionals, were unaware of the development of biological weapons in different countries, so she compiled the history, development, and proliferation of bioterrorism in Great Britain, the United States, Japan, and the Soviet Union.

Having been a scholar of biological warfare history for more than fifteen years, I was pleased by the sources of information Dr. Guillemin used in creating *Biological Weapons*. You can spend years reading volumes of thirty- and fifty-year-old technical documents, histories, and monographs; or you can read *Biological Weapons*. Dr. Guillemin deduces the history of biological warfare programs to an initial offensive phase, a second treaty phase, and a final defensive phase.

Another aspect that makes *Biological Weapons* worth reading is the influence that the science-for-peace movement had on the Nixon Administration's decision to end the US biological weapons program. The author puts these decisions into historical context, identifies trends within nations that lead to the rise and fall of biological weapons programs, and raises the concern of a possible return to an offensive program.

Because of the nearly complete historical review that *Biological Weapons* provides, it is a highly recommended book.

Dew of Death: The Story of Lewisite, America's World War I Weapon of Mass Destruction, Joel Vilensky, Indiana University Press, 2005.

Some historians believe that the Manhattan Project during World War II was without precedent. During World War I, the Chemical Warfare Service (CWS) undertook a secret weapons project to produce the arsenical blister agent, lewisite. The parallels between the two projects are not coincidental. The *Dew of Death* describes how prominent figures involved with the Manhattan Project were also chemical Soldiers engaged in the Lewisite Project during World War I.

Mr. Vilensky presents a comprehensive and complete history on a chemical agent that was a celebrated contribution to chemical warfare through World War II. *Dew of Death* is a story of dichotomies—an agent that failed to live up to military expectations but prompted the development of a significant therapeutic medicine, the achievements and conflicts between the two scientists that discovered the agent, and the irrational fear of casualty potential versus the known environmental dangers.

While most historic accounts of the CWS are focused on administrative functions, Mr. Vilensky does an excellent job of bringing World War I experiences to life. Using personal accounts, biographies, and local historical information, he pieces together a story that focuses on the depth and clarity of what it was like to be a part of the Nation's chemical warfare effort during World War I.

I highly recommended *Dew of Death* because it presents a realistic portrayal of the formative years of the CWS and a clear presentation of the rumors and mystery surrounding lewisite. Today, lewisite continues to be an environmental problem in many places (especially in the former Soviet Union) and remains a viable chemical warfare agent. During World War II, lewisite as a weapon proved to be unsatisfactory. By the late 1950s, the chemical proved of little use to the Chemical Corps. But the use of lewisite did stimulate enough interest that British antilewisite (BAL)—an agent widely used today in medicine to treat metal poisonings and neurological conditions—was discovered.

Mr. Kirby is a project manager for TALX Corporation. He holds a bachelor's degree in valuation science from Lindenwood College, with a minor in biology and special studies in behavioral toxicology and biotechnology.

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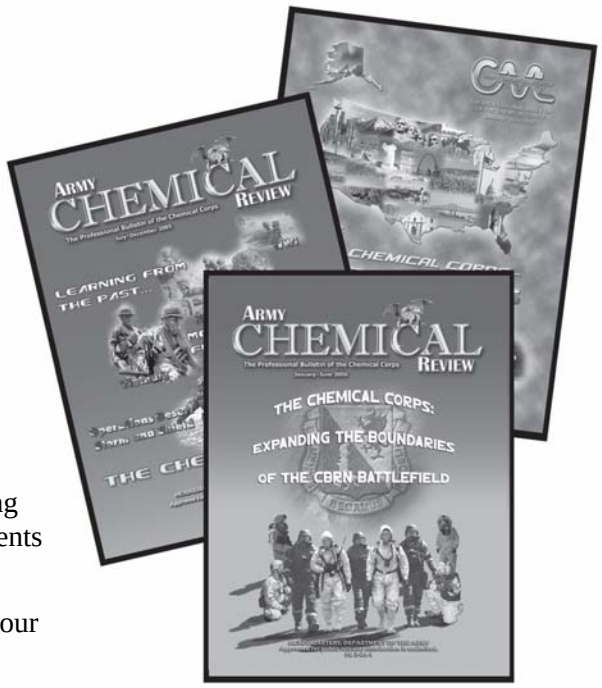

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Wash Rack Operations: The Use of Unit Decontamination Assets to Enhance Vehicle PMCS

By First Lieutenant Jerry Daugherty

Near the end of December 2003, as the Soldiers of the Army's first Stryker Brigade began preparing for movement to their new area of operations in Iraq, the Dragon Soldiers from two battalions in the 3d Brigade, 2d Infantry Division, were uniquely tasked to perform missions other than those typically expected of chemical Soldiers. There was a simple problem: Due to several continuous weeks of combat operations in the soft clay mud, most of the brigade's vehicles needed to be thoroughly cleaned to facilitate preventive-maintenance checks and services (PMCS) efforts prior to movement. But, there was an equally simple solution: Use the brigade's organic chemical, biological, radiological, and nuclear (CBRN) decontamination assets to provide high-pressure spray capabilities at a makeshift wash rack.

The wash rack was constructed along a small section of the airfield within the confines of the forward operating base (FOB). First, engineers prepared drainage trenches on both sides of the runway for runoff control. Next, multiple M-17 Lightweight Decontamination Systems were positioned near the drainage trenches on opposite sides of the runway and were subsequently prepared for operation.

As the first mud-caked Stryker vehicles; heavy, expanded-mobility, tactical trucks (HEMTTs); and high-mobility, multipurpose, wheeled vehicles (HMMWVs) rolled forward to the wash points, it became quite clear just how important wash rack operations would be to completing the PMCS requirements necessary for successful movement. Even though vehicle crews had valiantly attempted to remove as much of the mud as possible using pioneer tools, many areas of the vehicles could not be sufficiently cleaned by such methods. The high-pressure water available with the M-17s served as the primary means of cleaning these areas. Although the vehicle crews were responsible for spraying the vehicles, chemical Soldiers actually operated the M-17s. The chemical Soldiers also ensured that vehicle crews did not waste water by carelessly spraying the vehicles or by focusing cleaning efforts on nonessential areas of the vehicles.

Wash rack operations were conducted eight hours per day for a period of two weeks, providing the opportunity for every vehicle within the brigade to be processed through the wash rack. Understandably, some vehicles were muddier than others and, consequently, required more attention. Therefore, on a case-by-case basis, extremely muddy vehicles were allowed additional spraying time, as determined by the wash rack officer in charge (OIC) or noncommissioned officer in charge (NCOIC).

Overall, the wash rack operation was a great success. Although time and resource constraints made it impractical to clean the vehicles to the level of satisfaction desired by some of the crews, all vehicles attained a level of cleanliness which assured that proper PMCS could be conducted. Additionally, conducting wash rack operations provided an excellent training opportunity for chemical leaders and Soldiers to plan and execute a nondoctrinal support mission using the skill sets that may be necessary to perform combat missions.

First Lieutenant Daugherty is a decontamination platoon leader with the 23d Chemical Battalion. He holds a bachelor's degree in history from Western Kentucky University.

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