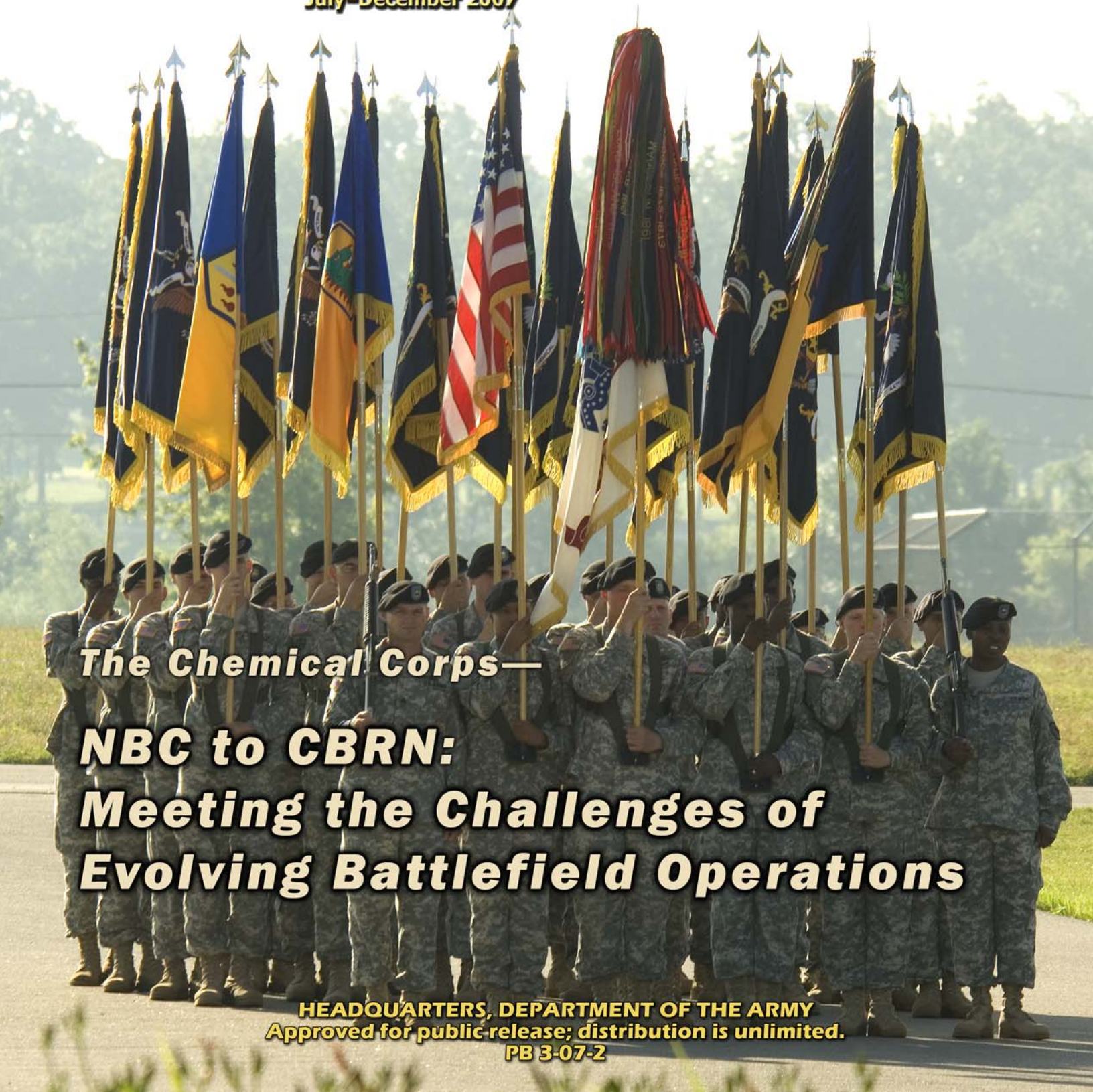
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The Professional Bulletin of the Chemical Corps
July–December 2007



The Chemical Corps—

NBC to CBRN: Meeting the Challenges of Evolving Battlefield Operations

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USACMLS
DSN 676-XXXX

COMMANDANT
BG Thomas Spoehr 573-563-8053
<thomas.spoehr@us.army.mil>

ASSISTANT COMMANDANT
COL Greg Olson 573-563-8054
<greg.olson@us.army.mil>

CHIEF OF STAFF
LTC Doug Straka 573-563-8052
<doug.straka@us.army.mil>

COMMAND SERGEANT MAJOR
CSM Patrick Z. Alston 573-563-8053
<patrick.alston@us.army.mil>

3D CHEMICAL BRIGADE
COL Peggy Combs 573-596-0016
<peggy.combs@us.army.mil>

DIRECTORATE OF TRAINING AND TRAINING DEVELOPMENT
COL Debra Thedford 573-563-4111
<debra.thedford@us.army.mil>

PERSONNEL PROPONENCY OFFICE
Vacant 573-563-7691

CHEMICAL DEFENSE TRAINING FACILITY
LTC Daniel Murray 573-596-0608
<daniel-murray@us.army.mil>

MANSCEN DIRECTORATE OF TRAINING, DEVELOPMENT SUPPORT DIVISION, PUBLICATIONS SUPPORT BRANCH
Managing Editor, Diane E. Eidson 573-563-4137
<diane.eidson@us.army.mil>

Editor, Kimberly S. Whitacre 573-563-5274
<kimberly.whitacre@us.army.mil>

Contributing Editor, Diana K. Dean 573-563-5004
<diana.k.dean@us.army.mil>

Graphic Designer, Denise F. Sphar 573-563-5288
<denise.sphar@us.army.mil>

Covers:
Computer design and layout by Denise F. Sphar
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By Order of the Secretary of the Army:

GEORGE W. CASEY, JR.
General, United States Army
Chief of Staff

Official:



JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army
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ARMY CHEMICAL REVIEW

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2 **Chief of Chemical**

3 **Regimental Command Sergeant Major**

4 **Something Old, Something New, Something Borrowed, Something Blue . . . and Gold: The Chemical Corps' Conversion From NBC to CBRN**
by Major Joseph J. Hauer

7 **CBRN Preparedness Transformation Vision and Strategy**
by Lieutenant Colonel James Demyanovich

10 **Shifting Chemical Leader and Staff Training to Meet the Demands of the "Long War"**
by Colonel David Oaks

12 **Chemical Corps Dedicates First Lieutenant Terry Training Facility**
by Mr. Christian DeLuca

13 **Do We Need a CBRN Operations Warrant Officer Corps?**
by Colonel Robert Walk and Chief Warrant Officer Two Charles McKnight

16 **Honoring Our Fallen Dragon Soldiers**

17 **2008 Army Deployment Excellence Award Competition**
by Mr. Henry H. Johnson

18 **The 329th Chemical Company Conducts CBRN Reconnaissance Exercises in Preparation for Deployment to Iraq**
by Mr. Phillippe L. Kebreau

20 **Dragon Soldiers Battle for Honors**
by Mr. Christian DeLuca

22 **The Evolving Role of Biological Weapons**
by Mr. Reid Kirby

27 **Chemical School Staff Ride to Shiloh**
by Ms. Christy Lindberg

28 **Army Reaches Chemical Weapons Convention Milestone**

29 **U.S. Army Flamethrower Vehicles (Part One of a Three-Part Series)**
by Captain John Ringquist

33 **Sugar-Based Smoke in Colored Grenades Protects Soldiers, Environment**
by Major Keith Taylor

34 **Doctrine Update**

36 **Fort Lewis Chemical Soldiers Participate in YS 51**
by Second Lieutenant Kristy Moore

38 **2006 Order of the Dragon Program Inductees**

40 **2007 U.S. Army Chemical Corps Hall of Fame Inductee**
by Ms. Christy Lindberg

41 **2007 Distinguished Members of the Chemical Corps**
by Ms. Christy Lindberg

43 **Gas, Gas Masks, and Smelly Clothing: The Unsung Heroes of the Chemical Warfare Service During World War II**
by Colonel Robert Walk

50 **The Lobster Battalion Reunites at Fort Leonard Wood**
by Ms. Christy Lindberg

52 **Reserve Component Update**

54 **2008 Nominations for the Hall of Fame and Distinguished Member of the Corps Honors**

55 **Book Reviews**
by Mr. Reid Kirby

57 **2007 Writing Contest**

Chief of Chemical



Brigadier General Thomas Spoehr

Greetings Dragon Soldiers! As I write this article, we have just concluded the celebration of the 89th Anniversary of the founding of the U.S. Army Chemical Corps (28 June 1918–28 June 2007). For those who were able to travel to Fort Leonard Wood, Missouri, thank you for making the trek! For those who were unable to attend due to operational commitments, funding, or other reasons, we missed you. We celebrated our Corps' great history in style. We conducted a warfighter seminar; sergeants' major, general officers', and colonels' conferences; the Dragon's Peak Competition; the National Defense Industrial Association (NDIA) Joint Chemical, Biological, Radiological, and Nuclear (JCBRN) Conference; a regimental review (honoring the August 2007 retirement of the 23d Chief of Chemical, Brigadier General Stanley Lillie); Hall of Fame and Distinguished Members of the Corps induction ceremonies; the Green Dragon Ball; a sunrise memorial service; a Regimental golf tournament, and a Regimental run.

What a great week! My thanks go out to the Chemical Corps Regimental Association—its support contributed greatly to making this week a success. The celebration was a wonderful opportunity to make new friends and renew old friendships.

We heard briefings from warfighters who recently returned from missions during Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF), including Soldiers from V Corps (returning from OIF); 10th Mountain Division (Light Infantry) (returning from OEF); 4th Infantry Division (Mechanized) (returning from OIF); and III Corps (currently serving as the base element for the Multinational Corps–Iraq). We had frank discussions on areas where the Chemical Corps is doing well and on areas where we could improve our capabilities. We look forward to the events of next year, when we celebrate the Corps' 90th Anniversary. You won't want to miss the great event!

The theme for this issue of *Army Chemical Review* is "Meeting the Challenges of Evolving Battlefield Operations"—and it could not be more timely because battlefield operations continue to evolve. Chemical, biological, radiological, and nuclear (CBRN) forces in Iraq continue to face asymmetric threats during daily operations (such as the use of chlorine and other hazardous material). Chemical forces and staffs are reacting magnificently to provide commanders with advice and the protective measures needed to counter these threats and meet the Chemical Corps Vision:

A Corps and Army capable now of countering the entire range of CBRN threats and effects to protect our Nation, operating seamlessly with military and civilian partners, while conducting simultaneous operations from civil support to war.

Our Corps and our military forces must be able to operate along the continuum of military operations, providing support to civil authorities in the homeland and to commanders and the Army during combat operations. We cannot afford to be lured into thinking that one of these military operations is more important than the other, nor can we allow ourselves to focus on one mission to the detriment of the other. Our training, doctrine, and equipment must be capable of supporting all mission areas to combat weapons of mass destruction. I am confident that our Corps is moving along the right path to realize these capabilities.

Regimental Command Sergeant Major Alston and I will continue to visit Dragon Soldiers and units. We look forward to seeing you and talking about the direction our Corps is taking. As always, we welcome your frank input and ideas to improve our Corps. And I ask you to always be on the lookout for ways that you can assist other Dragon Soldiers. For those of you operating in harm's way, you are in our constant thoughts and prayers.

Elementis, Regamus, Proelium!

Regimental Command Sergeant Major



Command Sergeant Major Patrick Z. Alston

Greetings Dragon Soldiers! Recently, I was engaging in a reflective moment and realized just how great it is to view the dawning of each new day. The dawning of a new day introduces new challenges to face, policies to embrace, tactics to achieve, and concepts to understand as the Chemical Corps moves forward at a pace that has never been greater. The Corps must remain relevant and ready—focused on the task of meeting the challenges of evolving chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) battlefield operations.

The Chemical Corps already has some great assets; however, stagnation is never our goal. We continue to have organizational growth which, in turn, increases personnel growth. I would like to take this opportunity to highlight the Corps' upward mobility concept by focusing on the 20th Support Command (CBRNE) (also referred to as the *CBRNE Command*). The command integrates, coordinates, deploys, and provides trained and ready forces and is prepared to exercise command and control of specialized CBRNE operations for joint and Army commanders.

As we meet the challenges of battlefield operations, the Chief of Chemical's vision for the Chemical Corps continues to move us forward by equipping and training the force to be true combat multipliers for combatant commanders. The 20th Support Command (CBRNE) consists of professional Soldiers who are imbued with the warrior ethos and are technically and tactically ready to face future battlefield challenges. We have increased our capabilities through operational teams specializing in CBRNE coordination, emergency response, nuclear disablement, chemical and biological disablement and elimination, and remediation and restoration.

Our Corps continues to provide a Center of Excellence where leaders and Soldiers can obtain advice on CBRNE technical information in areas such as command and control, communications, hazards, facilities, and remediation and restoration.

The Chemical Corps is an ever-evolving force provider that is collectively training to ensure readiness on all battlefield fronts. The dawning of the new day and the Corps' ability to respond, assess, mitigate, and eliminate CBRNE hazards will secure brighter tomorrows for our Nation!

The birth of the 20th Support Command (CBRNE) was due largely to the fear of a CBRNE terrorist attack on the U.S. mainland. The Army reassessed its options and consolidated its specialized assets under the 20th. The 20th Support Command (CBRNE), a subordinate command assigned to the U.S. Army Forces Command, was officially established in October 2004 and will become fully operational in 2009. Prior to the unit's creation, specialized U.S. Army CBRNE assets were organized under the U.S. Army Materiel Command as part of an interim guardian brigade. This provisional brigade provided the Army with the time needed to properly prepare, organize, and resource the 20th with full-spectrum CBRNE capabilities and the ability to support combatant commanders and local first responders (such as emergency services) within the continental United States (CONUS) and outside the continental United States (OCONUS). When fully operational, units under the 20th Support Command (CBRNE) will include the 52d Ordnance Group, 71st Ordnance Group, 48th Chemical Brigade, and 111th Ordnance Group (Army National Guard).

The 52d, 71st, and 111th will be designated as explosive-ordnance disposal (EOD) units. The 20th will leverage these subordinate units and provide the Army with a diverse response force that is capable of operating in a variety of environments (from small, heavily populated metropolitan areas to severely impacted larger areas). At full operational capability, the 20th will provide the Nation and the Army with a robust response force capable of conducting CBRNE and weapons of mass destruction operations across the full range of military operations.

The Chemical Corps continues to employ our greatest asset: the Soldier. The U.S Army Chemical School is moving forward to solidify this great asset through training, education, doctrinal guidance, and technical support. The Corps continues to meet the challenges of the War on Terrorism and its threats to the Nation by increasing organizations and enhancing personnel. One outstanding initiative is incorporating a Corps warrant officer program. Not only will this program maintain the service longevity of skilled Dragon Soldiers, it will also synchronize the skill sets that our Soldiers possess to better support the combatant commander.

At the end of the day, when dusk sets in, this Nation and our Army can rest assured that Dragon Soldiers are focused on the task of meeting the challenges of evolving battlefield operations.



Something Old, Something New Something Borrowed, Something Blue . . . and Gold: The Chemical Corps' Conversion From NBC to CBRN

By Major Joseph J. Hauer

Well, we've done it again! We've changed our primary Corps acronym, and it is seemingly close to something it once was. Although the term *chemical, biological, radiological, and nuclear (CBRN)* has been in use since the beginning of the new millennium, it was only on 26 August 2005 that we doctrinally changed from nuclear, biological, and chemical (NBC) to CBRN. At first glance, it looks as if someone just rearranged the letters, but there is a great deal more to the change.

Historically, the Chemical Corps focused on chemical hazards specifically designed to inflict casualties on enemy personnel and to provide defense countermeasures to combat an enemy's use of chemicals. In 1942, biological warfare was assigned as a function of the Chemical Corps (known then as the Chemical Warfare Service) and, in 1949, radiological warfare was added. For a short period of time in the late 1940s and early 1950s, the term *chemical, biological, and radiological (CEBAR) warfare* was used. But on 10 September 1951, chemical, biological, and radiological (CBR)—an acronym that designated the Corps' three major core functions—became the official term used by the Army and the Chemical Corps. This term also applied to Corps personnel (such as CBR officer and CBR noncommissioned officer [NCO]).

Another early term used by the Corps was *atomic, biological, and chemical (ABC) warfare*. This term only lasted until the advent of the hydrogen bomb, first detonated by the United States on 1 November 1952. In the mid-1970s, the Corps began transitioning to NBC as the term of choice. But interestingly, only Corps NCOs had NBC in their titles—officers were called Chemical officers.

So why has the name changed once again? The term *CBRN* is certainly more encompassing than NBC, covering all hazards, including toxic industrial chemicals and toxic industrial material (not just CBRN materials that have been weaponized). The mission is now more than passive defense; it includes weapons of mass destruction (WMD) elimination and consequence management—full-spectrum CBRN operations. Some would consider 11 September 2001 as the date that triggered the need to change to CBRN, and this is logical in that we began using the term shortly after the events on that fateful day. However, we can go back to several events in the 1990s that were the genesis to this change.

In 1991, the Soviet Union broke up (effectively ending the Cold War era) and the United States concluded a successful liberation of Kuwait. However, at the end of Operation Desert Storm, two key events occurred that altered the environment in which our military operated. Many of us can remember the images of the burning oil wells on our televisions, but few probably recall the 1991 open-air destruction of agent-filled rockets at Khamisiyah, Iraq, that produced a low-level agent cloud. A few years later (in 1995), members of the Aum Shinrikyo cult entered the Tokyo subway system and released the deadly nerve-agent sarin, bringing to the forefront the role the Corps could play in the U.S. homeland security mission. Additionally, we found ourselves operating in Bosnia, where Chemical Soldiers had to deal with locating, identifying, and plotting hazards to protect Soldiers, not from the massive Soviet chemical-agent strikes Dragon Soldiers were trained for, but from the numerous CBRN

and industrial hazards at production and storage sites in the former Yugoslavia. Our doctrine and training were focused on Cold War methodology, but reality had moved our requirements beyond that point. North Atlantic Treaty Organization (NATO) forces were required to clear, secure, and/or mark these production and storage sites which, incidentally, was the birth of modern sensitive-site exploitation (SSE) missions. Stranger than fiction, the Chemical Defense Training Facility (CDTF) at Fort Leonard Wood, Missouri, piloted an SSE advanced scenario on Bosnia to several Chemical Captain's Career Course (CMC3) and Chemical Advanced NCO Course (ANCOC) classes in 2001 and 2002. The Chemical Corps was on the way to change!

During Operation Iraqi Freedom (OIF), organization, doctrine, training, and equipment hadn't fully prepared Chemical Corps Soldiers to locate and identify Saddam Hussein's WMD sites or to operate in various environmental hazards. Unfortunately, sometimes the wheels of change don't move as quickly as we would like. Many of you are still asking what the U.S. Army Chemical School is doing to move us into the 21st Century and what impact these changes will have on Chemical Soldiers and leaders.

For a start, Chemical Soldiers have been designated as CBRN Soldiers. Shortly after the official doctrinal term change, the Chemical School's Personnel Proponency Office submitted a military occupational classification and structure proposal to revise—

- Officer duty titles from Chemical and NBC to CBRN. This action was approved in May 2007 (see *blue box*).
- Officer Education System (OES) and NCO Education System (NCOES) course titles from Chemical and NBC to CBRN. This action was effective February 2007.
- Enlisted duty titles from NBC to CBRN. This action was approved in July 2006 (see *blue box*).

Additionally, the Directorate of Training and Training Development (DOT&TD) has initiated a proposal to change the name of the U.S. Army Chemical School to the U.S. Army CBRN School. The proposal was forwarded through the U.S. Army Training and Doctrine Command to Headquarters, Department of the Army, for approval; but title changes are only the tip of the iceberg. The DOT&TD Doctrine Division is like a duck swimming upstream: calm and collected on the surface, but furiously kicking below. Several publications are currently under revision and should be published this year. Long-awaited revisions include: Field Manual (FM) 9-20, *Technical Escort Battalion Operations* (which will become FM 3-11.20); FM 3-11.21, *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Aspects of Consequence Management;* and FM 3-11.34, *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Defense of Theater Fixed Sites, Ports, and Airfields.* The publication of these documents and others will bring us into alignment with joint doctrine, capture recent lessons learned, and provide Soldiers with the most up-to-date guidance for current operations (see *Doctrine Update*, pages 36–37).

Notification of Future Change to DA PAM 611-21

Summary of Significant Changes for Officers:

- Retitles Branch 74 to "Chemical, Biological, Radiological, and Nuclear (CBRN).
- Revises AOC 74A specifications and standards of grade tables. Retitles the area of concentration (AOC) to "Chemical, Biological, Radiological, and Nuclear (CBRN)." Duties, functions, positions, and personnel transferred from AOC 74B and 74C.

—U.S. Army Human Resources Command, Memorandum for Worldwide Distribution, 21 May 2007

Summary of Significant Changes for Enlisted Personnel:

- Retitles CMF 74 from "Chemical" to "Chemical, Biological, Radiological, and Nuclear (CBRN). Career progression chart revised.
- Revises MOS 74D specifications and standards of grade tables. Retitles the MOS from "Chemical Operations Specialist" to "Chemical, Biological, Radiological, and Nuclear (CBRN) Specialist."

—U.S. Army Human Resources Command, Memorandum for Worldwide Distribution, 13 July 2006

Training developers are hard at work developing institutional training to support full-spectrum CBRN operations. This includes a critical task selection board (CTSB) that will determine the CBRN competencies required at each skill level and what will be taught at OES and NCOES courses. Additionally, National Fire Protection Agency (NFPA) 472 standard hazardous material (HAZMAT) awareness level training is currently being integrated into our OES and NCOES courses—beginning in advanced individual training and progressing to the HAZMAT operational level in the Basic Officer Leader Course (BOLC) and the Basic NCO Course (BNCOC) and the HAZMAT technician level

in ANCOC and CMC3. Since August 2006, the CDTF training mission has expanded to include a CBRN SSE exercise in each professional course that trains at Fort Leonard Wood. We have witnessed a colossal program of instruction change for the Civil Support Skills Course (the capstone course for National Guard Bureau WMD-Civil Support Teams). Additionally, the new, state-of-the-art First Lieutenant Terry CBRN Response Training Facility at Fort Leonard Wood will offer enhanced training opportunities and graduate first-class CBRN responders (see *Chemical Corps Dedicates First Lieutenant Terry Training Facility*, page 12).

If I listed all the acronyms for equipment that we are working with the Joint Program Executive Office to deliver to our CBRN forces, it would make your head spin. Items such as the Joint-Service Transportable Decontamination System (JSTDS); Joint Warning and Reporting Network (JWARN); joint-service, general-purpose mask (JSGPM); and Joint-Service Personnel Skin Decontamination System (JSPDS), to name a few. We are working toward a tricorder that acts as a universal global positioning system, hazard detector, and heart monitor; but we're not quite there yet. What we are doing is fielding Stryker brigade combat teams with NBC reconnaissance vehicles (NBCRVs); soon, we should have a full-rate production decision on the NBCRV, which would potentially fill our CBRN reconnaissance platoons in heavy brigade combat teams (replacing the Fox M93A1 NBC Reconnaissance System). Additionally, we are already fielding the third generation of the Biological Integrated Detection System (BIDS) with the Joint Biological Point Detection System (JBPDS). The first-generation model will soon be a museum piece on display at the Chemical Corps Museum.

Since its activation in October 2004, the 20th Support Command (Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives [CBRNE]) has undergone a growth in mission, manning, and capabilities. It is the Army's one-stop shop for the response, assessment, mitigation, and elimination of CBRNE hazards worldwide. With the conversion of the U.S. Army Technical Escort Unit (TEU) to the 22d Chemical Battalion (Technical Escort) in 2004 and the 110th Chemical Battalion in 2005, the Corps is working to update the technical escort force design to better support WMD elimination and CBRNE response. Also undergoing change is the hazard response decontamination platoon, designed to provide the maneuver commander with a dismounted CBRN assessment capability. And in the era of personnel cuts and big Army reorganization, the Corps continues to maintain a capable CBRN staff capability (from company to combatant command staffs) and has increased, even if only slightly, our "conventional" capabilities. Additionally, division, corps, and Army headquarters are now authorized integrated CBRNE staffs (comprised of CBRN and explosive ordnance disposal officers and NCOs).

The change from NBC to CBRN was an eventuality, even without the official term change. Necessity forced us to move from traditional NBC warfare to include industrial CBRN materials and radiological dispersion devices, consider homeland defense and military support to civil authorities, and expand our role in combating terrorism and WMD elimination.

I have only highlighted a few of the many items that the Chemical School is working in support of our military and our Nation in the area of CBRN defense. Some items have been a work in progress for several years while others have been implemented rather quickly. But one of the greatest discoveries from OIF is the need to inject lessons learned, particularly in education and training, as soon as possible (an option not always available in the past). As we look to the future, there is no doubt that the Corps will undergo many more changes. But, more importantly, as enemy technologies and capabilities evolve, we can't be reactive. We must anticipate change—preevolve—to be responsive and relevant. Now, is anyone ready for chemical, biological, radiological, and antimatter (CBRA) defense?

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Major Hauer served as the Chief of the Personnel Proponency Office, U.S. Army Chemical School. He holds a bachelor's degree in biology with a minor in chemistry from SUNY Brockport, Brockport, New York.

CBRN Preparedness Transformation Vision and Strategy

By Lieutenant Colonel James Demyanovich

This article describes a vision and strategy for the military services to achieve near-term, transformational capabilities in chemical, biological, radiological, and nuclear (CBRN) situational awareness based on today's technologies. This vision and strategy are proposed by the author using selective CBRN sensor technologies, linked to organic communications architectures, and inserted into near-term military systems (platforms). This technology insertion and integration would be selective and, in most cases, transparent to system operators. Only through analyses (not attempted here) can this vision be crafted into a feasible approach that transforms diverse and disconnected elements of CBRN defense equipment into a network of situational awareness. Follow-on, robust systems analyses and experimentation may shed light on specific material solutions and approaches that can provide our military with the integrated and efficient CBRN situational awareness it has long sought (provided as architecture built into military platforms).

An overarching premise: In an operational environment under a credible CBRN threat, situational awareness, vulnerability assessment, and hazard estimation are clearly commander's critical information requirements (CCIRs). Leaders need accurate and understandable information on CBRN incidents. And this information must be constantly updated and transmitted in situational assessments. CBRN events can affect large swaths of operational space and impact forces for hours and at distances up to tens of kilometers downwind. Current methods of equipping forces for CBRN situational awareness have focused on providing handheld equipment to individual operators and units. The incorporation of a selected set of automated and integrated CBRN sensor technologies into platforms is a step in transforming military situational awareness with potentially near-term, achievable benefits across the force.

How do U.S. forces sense CBRN events? At the unit level, CBRN equipment is electronic and nonelectronic. Nonelectronic items are typically single-use items meant for critical individual and small-group survival tasks (such as liquid contamination detection, highly toxic vapor detection, or individual decontamination). Most electronic CBRN sensors provide information on CBRN hazards that are immediately dangerous. Critical CBRN detection information is first directed to the unit CBRN equipment operators and then to unit leadership to brief higher commands. This user level information focus has incrementally helped equipment operators with new end items of equipment that provide added CBRN capability.

Unfortunately, every added piece of equipment requires user attention. When CBRN sensors alert operators to positive detections, the operators must focus first on survival actions such as donning a protective mask, warning others, and donning protective suits. Later, the operators report sensor findings through command channels. Sharing CBRN sensor data and updating it regularly becomes a significant task, often overcome by other operational priorities. This is particularly problematic due to the lack of connectivity between most CBRN sensors and military command, control, communications, computers, and intelligence (C4I) systems that are often within arm's reach of one another on military platforms. Equipment operators often interpret and report CBRN sensor readings by typing text reports or relaying voice messages using their organic C4I systems.

How can CBRN situational awareness be significantly improved? Transferring critical CBRN sensor data automatically into C4I systems is the key. The proposed, transformational approach equips military platforms with a set of high-value CBRN awareness sensors as built-in features "behind the dashboard." Such features will displace some existing CBRN sensors (following a required capabilities reevaluation). This displacement is possible because many of the CBRN sensors dedicated to area warning are fielded as handheld equipment. Following a realistic, CBRN operational scenario analysis and capability requirements review, selected CBRN sensors could be recommended for platform integration. These sensor capabilities may or may not use existing CBRN sensors rugged and reliable enough to be integrated directly into platforms as subsystems. Appropriate, low-maintenance CBRN technologies could be modularized and systematically applied to a myriad of platforms at the subsystem level.

What is transformational about this approach? The real change is not just the value of automatic and local CBRN sensing, but the process of sensing and reporting data consistently and automatically at and from the

platform level. Automating the CBRN reporting task is a vital and needed capability, but automatic reporting requires negative detection reports that also indicate hazard reductions and passage restrictions. Adding such reports for areas free of CBRN hazards would significantly enhance the operational understanding of evolving CBRN events and provide a more accurate ground truth. CBRN technology connectivity to existing platform level C4I systems is required. This C4I integration would be included to distribute CBRN data digitally. The availability and interpretation of CBRN data would then provide significant information to platform operators and higher command echelons. Each platform would give individual elements a larger web of friendly CBRN situational awareness. This totally contrasts with the low level of CBRN awareness created using manually generated text or voice reports. The platform level CBRN data streams and updates would provide command echelons with required, regularly updated CBRN CCIR for operational forces to provide a better understanding of CBRN events.

For example, the current inventory of high-mobility, multipurpose, wheeled vehicles (HMMWVs) in use could be transformed under this proposal. The changes could occur at the depots or factories during recapitalization or as modifications during the construction of new end items for fielding. Outwardly, there would be little indication of significant changes to the platform. Today, many military units are equipped with HMMWVs, and some transport organic CBRN sensors. However, the use of CBRN equipment while traveling in a HMMWV varies significantly from situation to situation, vehicle to vehicle, and unit to unit.

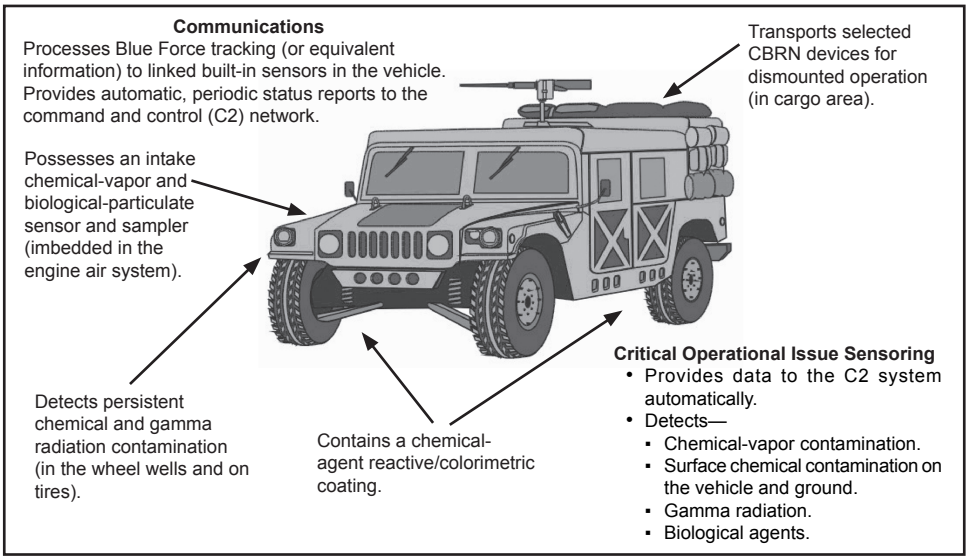
Current CBRN sensors—

- Are used primarily to warn operators of grave danger.
- Are manually employed and visually monitored.
- Depict CBRN detection events that must be reported with existing C4I systems (typed digital reports or voice reports).
- Require that the operator direct tasks for initial CBRN detection reporting and periodic situation updates through typed digital reports or verbal reporting on C4I systems.
- Operate at the discretion of equipment operators.
- Are mostly disconnected from platform C4I systems.

With sensor integration and data connectivity, CBRN sensors and capabilities built into platforms can—

- Warn operators of grave danger and automatically notify higher commands.
- Automatically operate when platform C4I systems report sensor information and alerts.
- Automatically report CBRN detection events as digital data on existing C4I systems (in standard report formats) with operators adding information as needed.
- Provide initial CBRN detection reporting and periodic situation updates based on algorithms, without operator direct actions (unless directed to do so, using available C4I systems).
- Exploit platform C4I systems to provide CBRN sensor data using existing critical data streams (such as Blue Force tracking) to provide CBRN event information as CCIR (in addition to friendly force locations).
- Provide added features, such as chemical-biological sample collection ports (added as a vehicle power plant air intake) as sample collector modules.
- Establish a common baseline of CBRN sensing capabilities across military services to ensure common and uniform operations.

What should a priority set of integrated CBRN sensors consist of? Based on experience, an initial set of



Future HMMWV with added CBRN capabilities

CBRN equipment for integration at the platform level may include—

- The detection of chemical warfare agent (CWA) in the vapor phase from ambient and crew compartment air.
- Selected or tailorable toxic industrial chemical (TIC) gas sensors.
- Gamma radiation sensors.
- Aerosol, particulate biological-agent discrimination and collection equipment.
- Toxic-gas sample collection and accumulator (CWAs and TIC).

A new feature that is not currently in the military could include equipment coating as a replacement for current chemical agent-resistant coating. A new reactive coating would indicate, by a color change, the presence of liquid chemical-agent surface contamination and perhaps react with the agent destructively and delaminate to remove surface and penetrated contamination.

A possible technology experimentation and demonstration process could provide cross-community evaluation and refinement of an initial selection of CBRN technologies.

Parallel joint and service experimentation efforts should be initiated and could include, but are not limited to, CBRN technologies focused on—

- Joint warfighting experimentation that takes into consideration the value of near-real-time, platform level CBRN sensing, as compared to existing capabilities against threat scenarios. This would establish a balanced need for services operating as part of joint operations.
- Joint concept development and experimentation efforts that determine service needs and desires for platform level CBRN sensing, initial service desires for initial and periodic sensor data updates before and following CBRN events, and priority ranking.
- Current C4I systems, particularly when evaluating the suitability of existing and planned systems to transmit CBRN sensor data. This would include evaluating existing systems and available infrastructure capabilities to accommodate key CBRN data and estimating how much data could be accommodated during routine and surge CBRN events.
- Department of Defense (DOD) level requirement reviews and documentation (as needed).
- Science and technology reviews for available CBRN sensing technologies that might provide required user near- and mid-term capabilities and information.
- Acquisition program reviews of existing technologies that might be selectively harvested for sensor integration.

What are some challenges in a transformational CBRN sensor approach to platforms?

Programmatic challenges are indicated above and would include—

- Accepting built-in features as a transformational vision for CBRN capabilities involving collective agreements from DOD CBRN defense efforts and service level programs.
- Establishing an overarching CBRN sensor and C4I integration baseline for platform levels that will ensure DOD commonality of CBRN capabilities.
- Establishing a DOD draft, platform level, CBRN subsystem integration baseline.

Military operations are more dispersed over wide areas and can benefit from automating and integrating available CBRN preparedness enhancements to their platforms. These enhancements would provide consistent levels of continuous CBRN situational awareness. The integration of selected CBRN sensors at the platform level, with C4I integration incorporated, provides a leap ahead in CBRN situational awareness capabilities. Current CBRN sensing systems do not readily interface with C4I systems without fielding added C4I interface devices. The integration of CBRN sensing into platforms focused on C4I system connectivity provides a new level of CBRN sensing. U.S. Forces, with continued enhancement of net-centric operations, will benefit from this effort. This approach can truly transform CBRN situational awareness and provide our services with capabilities that allow for the best awareness of and response to CBRN operational conditions.

Lieutenant Colonel Demyanovich is a CBRN advanced technology demonstration manager, Defense Threat Reduction Agency, Chemical and Biological Technologies Directorate. He holds a bachelor's degree in energy technology (mechanical engineering specialty) from Pennsylvania State University and a master's degree in operations research and systems analysis from the Naval Postgraduate School.

Shifting Chemical Leader and Staff Training to Meet the Demands of the "Long War"

By Colonel David Oaks

The Army is changing to respond to the war we are fighting in the Middle East—the Long War. The Chemical Corps is also changing, moving away from its traditional battlefield missions such as smoke operations to newer missions such as biological detection. And while the Corps is indeed transforming, it may be overlooking the full potential of its Soldiers' contributions to this new kind of war. The Army may also be overlooking this opportunity. For example, Field Manual (FM) 3-24, *Counterinsurgency*, makes no reference to chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE). This omission should not inspire fear of irrelevance, but rather motivate Chemical Soldiers to demonstrate that they can be a unique and valuable asset in the counterinsurgency fight. The 455th Chemical Brigade (U.S. Army Reserve), Fort Dix, New Jersey, participated in a 2006 battle command staff training (BCST) exercise that illustrates this point.

The BCST is a 36-hour, simulation-driven command post exercise designed to train brigade and subordinate battalion staffs on their mission-essential task lists (METLs). The First U.S. Army maintains overall charge of the BCST program, while the 1st Brigade, 78th Division (Training Support), conducts and supports training in the northeast region.

In the spring of 2005, the 455th was notified that it would participate in a BCST exercise the following spring. The exercise scenario attached the brigade to a corps and assigned the mission of assisting friendly governments in defense operations against foreign conventional and unconventional forces. The announcement of the BCST was met with some skepticism by brigade Soldiers. The headquarters had returned just 10 months earlier from a year-long deployment to Iraq, where it served with the Iraq Survey Group searching for weapons of mass destruction. Many of these Operation Iraqi Freedom I veterans expressed frustration with the need to be tested on their ability to operate in a combat scenario. The general feeling was that a conventional corps warfighter simulation exercise would not be of much use. But this expectation proved to be wrong.

In this BCST scenario, the corps assigned typical missions to the 455th: establish hasty and detailed decontamination sites, emplace Biological Integrated Detection System (BIDS) arrays at specified locations, and conduct a large-area smoke operation. The priorities of the exercise included avoiding contamination through reconnaissance, protecting the force with smoke, and recovering combat power through decontamination operations. The threat assessment included the possible use of biological and chemical weapons. Terrorist activity through the spread of biological agents, toxic industrial chemicals (TIC), or toxic industrial material (TIM) was also expected.

During mission analysis, the 455th determined that indigenous population decontamination was an implied mission. Preparing for this eventual mission would pay the following dividends as the BCST unfolded:

- Avoiding congestion in a main supply route (MSR) that passed through the largest city in the corps area. Keeping the MSR open was a key objective for the corps commander. The in-place treatment of civilian casualties encouraged the population to remain stationary and not clog the MSR.
- Reinforcing support for the host nation government. A rapid and effective response to an attack on the local population met the information operations support goal.
- Reducing the effectiveness of terrorism as one of the enemy's weapons by promptly responding to an attack.

During the first 12 hours of the exercise, there were several unconfirmed reports of enemy elements conducting small chemical and biological attacks in the corps rear area. Almost simultaneously, the 455th Chemical Brigade received a warning order to respond to a terrorist attack on two large pesticide plants located in the largest city in the corps rear. The mayor of the city requested coalition support to protect the civilian population and plan decontamination operations as

needed. This was the prompt for the brigade to implement the military decision-making process (MDMP).

While working through the steps of the MDMP, Soldiers from the 455th assessed the situation. Hazardous material (HAZMAT) qualified personnel (with additional skill identifier [ASI] J5) in the operations staff officer section evaluated the TIC produced at the plants, where it was discovered that the chemicals only posed a health threat to the population in a very large dose of the liquid form. The large explosions necessary to release TIC from storage tanks would vaporize the liquids before they could contaminate the adjacent housing areas. There was a negligible toxic danger to Soldiers and civilians (with the exception of those working at the plant and those killed or injured in the terrorist attack itself). However, there were still thousands of civilians living in close proximity to the plants. These civilians might panic, demand decontamination operations, or flee the area along the MSR.



Planning the scheme of maneuver

The recommended course of action presented to the brigade commander centered on the assessment that minimal, if any, chemical decontamination would be needed. However, to avoid panic in the civilian population, the 455th provided a decontamination team (roughly platoon-size) to demonstrate a show of strength. Additionally, the 455th requested 48-hour civil affairs, engineer, and military police support from the corps to coordinate with host nation officials, create a marked path, and man traffic control points to guide panicked civilians to the decontamination site or away from the MSR. The operation, termed *Task Force Decon*, was organized under the command of the subordinate chemical battalions and coordinated with the host nation government. The brigade commander approved this plan, and the 455th successfully worked through the MDMP event portion of the BCST exercise.

Beyond the learning event of implementing MDMP, there were other lessons Soldiers from the 455th Chemical Battalion took away from this training. One of these lessons was the value of HAZMAT (ASI J5) training. This unique expertise gave the brigade and, by extension, the corps commander the ability to analyze an unusual industrial chemical threat. Another lesson learned was not to be afraid to take charge in a tactical CBRNE event. Chemical Soldiers may find themselves at the forefront of a mission, not only for their rare and valuable expertise, but also because of their value as a symbol (information operation). Dragon Soldiers must be capable of and willing to create and lead a special task force.

In summary, take advantage of opportunities to participate in a BCST. They can serve as a terrific opportunity to practice the complex skills required in a counterinsurgency fight. And since BCSTs have external support, they present a unique opportunity for Chemical units to work with civil affair, engineer, military police, and (simulated) host nation forces. The BCST is an excellent training event!

References:

FM 3-24, *Counterinsurgency,* 15 December 2006.

Colonel Oaks is the Deputy Commander of the 455th Chemical Brigade. In his civilian career, Colonel Oaks is an analyst at the RAND Corporation in Washington, D.C. He holds a doctorate degree in public policy from RAND Graduate School.



Chemical Corps Dedicates First Lieutenant Terry Training Facility

By Mr. Christian DeLuca

On 26 June 2007, the U.S. Army Chemical School showcased its state-of-the-art training facility to fellow Corps members, friends, and family with a ribbon-cutting ceremony for the First Lieutenant Terry Chemical, Biological, Radiological, and Nuclear (CBRN) Weapons of Mass Destruction (WMD) Response Training Facility. The ceremony celebrated the completion of the facility and honored its namesake with speeches, presentations, and a tour of the main building. The Terry Facility occupies more than 40 acres at Fort Leonard Wood, Missouri, and will be used by Army National Guard civil support teams, Army Chemical units with homeland security missions, Department of Defense emergency response teams, and other Dragon Soldiers to train personnel on CBRN response readiness.

Brigadier General Thomas Spoehr, Chief of Chemical and Commandant of the U.S. Army Chemical School, said that the new $15 million facility will increase the Nation's readiness to defend itself from CBRN accidents and attacks. "On June 28, 2005, we celebrated the groundbreaking of this facility. Today, two years later, we're here to cut the ribbon. . . . [This facility is an indication] of the seriousness the United States of America places on protecting its citizens from a CBRN attack," he said.

From the initial design through the various stages of design reviews, the completed facility depicts a CBRN WMD Response Training Facility that will meet the emerging needs of a Nation at war and help combat the threat of terrorist attacks. The Terry Facility contains—

- A main building with classrooms, office space, training bays, a sensor and detector lab, and five training areas.
- An urban training area with four buildings connected by tunnels. This area will be used for group and individual training on CBRN scenarios.
- An intermodal container training area with a collection of International Maritime Organization intermodal shipping containers. This area will be used for individual and group training on site characterization and search, survey, and sampling procedures to identify possible harmful substances entering the United States on cargo ships.
- A vehicular training area with a concrete road intersection. This area will be used to train CBRN responders on controlling tanker truck spills.
- A railcar training area with 200 feet of rail and four types of railcars. This area will be used to conduct training on CBRN attack and spill scenarios.
- A cave complex that will be used for CBRN identification and response training.

During the ceremony, Brigadier General Walter Chahanovich, Deputy Commanding General for Mobilization and Training, U.S. Army Reserve, said that the new facility and the world-class training it will provide should bestow a sense of pride in the people who were involved in making it a reality. "This is a great day for [Brigadier] General Spoehr, the Army, the Army Reserve, and the Nation," he said.

The Terry Facility was named after First Lieutenant Joseph Terry, a World War II veteran and Distinguished Service Cross recipient. First Lieutenant Terry, who passed away in 1999, received the award for heroic actions that saved the lives of six Soldiers during a prolonged hostile artillery barrage. Terry was one of only nine Chemical Corps Soldiers to receive the Distinguished Service Cross during World War II. A plaque was dedicated in his honor during the ceremony, and a duplicate of the plaque was presented to his family.

Mr. DeLuca is a reporter for the Fort Leonard Wood Guidon.



Ribbon-cutting ceremony

Do We Need a CBRN Operations Warrant Officer Corps?

By Colonel Robert Walk and Chief Warrant Officer Two Charles McKnight

***The Army warrant officer is** a "self-aware and adaptive technical expert, combat leader, trainer, and advisor. Through progressive levels of expertise in assignments, training, and education, the WO administers, manages, maintains, operates, and integrates Army systems and equipment across the full range of Army operations. Warrant officers are innovative integrators of emerging technologies, dynamic teachers, confident warfighters, and developers of specialized teams of soldiers. They support a wide range of Army missions throughout their careers."*

—Department of the Army Pamphlet (DA Pam) 600-3

The U.S. Army Chemical Corps is a combat support branch that provides the Army with highly trained chemical, biological, radiological, and nuclear (CBRN) experts. But it is also a technical branch in that officers are needed as technical experts on CBRN hazards and operations. Currently, the Corps is composed of officers, noncommissioned officers (NCOs), and enlisted Soldiers. There are not, nor have there ever been, warrant officers in the Chemical Corps. This article explains the duties of the warrant officer and discusses the benefits and costs associated with creating a CBRN Warrant Officer branch.

Chemical Officers, NCOs, and Enlisted Soldiers

The Army warrant officer is a technical expert on the use and maintenance of Army systems. So why have we never had warrant officers in the Chemical Corps? In the early days of the Chemical Warfare Service (CWS), most Chemical Officers had a degree in chemistry. Personnel were recruited for their laboratory skills. There was little perceived need in the CWS for warrant officers other than the maintenance warrant officers in the chemical mortar battalions. At the time, no one expected warrant officers, NCOs, or enlisted Soldiers to have the same background as officers.

Chemical Corps officer, NCO, and enlisted Soldier positions have been reclassified as CBRN positions. As we move farther into the new century, Dragon Soldiers must become more knowledgeable in hazardous material (HAZMAT) operations to fully support the combatant commander. These Soldiers will contribute a value-added function; that is, they will be able to find and/or mitigate industrial hazards in the theater of operations. Chemical platoons will be hazard response ready—capable of conducting HAZMAT reconnaissance missions, traditional CBRN missions, and mass-casualty decontamination operations. And these new duties call for an entirely new skill set. The knowledge of detection and decontamination equipment will no longer be limited to the reasonably straightforward improved chemical-agent monitor (ICAM) and M22 Automatic Chemical-Agent Alarm (ACADA). Chemical Corps personnel will be required to perform HAZMAT operations using self-contained breathing apparatus units, fully encapsulating

***Army warrant officers** "possess a high degree of specialization in a particular field in contrast to the more general assignment pattern of other commissioned officers. Warrant officers command aircraft, maritime vessels, special units, and task organized operational elements. In a wide variety of units and headquarters specialties, warrants provide quality advice, counsel, and solutions to support their unit or organization. They operate, maintain, administer, and manage the Army's equipment, support activities, and technical systems. Warrant officers are competent and confident warriors, innovative integrators of emerging technologies, dynamic teachers, and developers of specialized teams of Soldiers. Their extensive professional experience and technical knowledge qualifies warrant officers as invaluable role models and mentors for junior officers and NCOs."*

—Field Manual (FM) 6-22

> ***Chemical Officers*** *must be "technically proficient with branch and mission-unique equipment, tools, and systems. Chemical mission success requires the proper balance between technical skills and the ability to understand and apply the appropriate tactical skills at the right moment. These skills must be gained and developed through repetitive operational assignments and continuous professional study and self-development. Chemical officers must not only know their own unique branch skills, tactics, techniques, procedures, and specialized equipment; but they must also know the uniqueness of the units to which they are assigned or are supporting."*
>
> *—DA Pam 600-3*

protection equipment, and detection equipment. In this role, Dragon Soldiers will provide assistance to civilians, first responders, other services, and other nationalities.

Emerging Equipment

There are 24 manuals that cover HAZMAT command and control operations. A recent review and update of an Army Reserve battalion hand receipt, performed by the U.S. Army Reserve Command, reflects the changes in emerging equipment related to increased HAZMAT operations (see *gray box*, right). The items listed are just a few of the items needed by the CBRN Soldier. Each detection kit is for a different hazard, so Soldiers must be experts on a variety of equipment types. With the increased mission load and specialized requirements, the need for nonstandard certification increases.

As the Chemical Corps makes the transition to a more technical branch, we must focus energy on developing technical specialists trained to operate CBRN equipment and expert trainers prepared to train and certify Corps Soldiers. From a larger perspective, officer training is becoming more generalized, but technology continues to march forward—creating an increased need for technical specialists.

Branch Outlook

As the Army transitions to the future force concept, the Chemical officer as we know it will disappear. The first change: eliminating the need for branch insignia on uniforms. All officers attend the same basic leadership training (Basic Officer Leader Course [BOLC] I and II). While BOLC III remains branch-specific, it will transition to common materiel, particularly with our brethren schools (Military Police and Engineer) at the Maneuver Support Center, Fort Leonard Wood, Missouri. The Chemical officer is in danger of losing his specialized training as he is transformed into a military pentathlete.

If Chemical Corps Officers lose their specialized training, what will happen to Chemical NCOs? NCO leadership training is also transitioning to common skill levels. More and more, leadership, the common military decision-making process, and computer training are interfering with the technical training requirements of Chemical NCOs. We have some outstanding technical NCOs in the Corps and in the Army, but how do you tell the difference between the technically gifted and the technically challenged? At the NCO level, you can't. You can pretty much figure that lieutenants are busy learning

The emerging equipment listed on an Army Reserve battalion hand receipt included—

- A consequence assessment tool set.
- An F-350 prime mover vehicle with a 35-foot HAZMAT trailer.
- A Cascade Systems multibottle cylinder set (6,000 pounds per square inch) with a booster and a refill station.
- A portable, public-address system.
- Personal-protection systems, including—
  - Level A, B, and C mission-oriented protective posture (MOPP) gear.
  - Powered, air-purifying respirators.
  - Self-contained breathing apparatus units.
  - QUESTemp° Series heat stress monitors.
  - Disposable coveralls.
  - Cooling vests.
  - Respirator and Silver Shield® gloves.

For detection operations during HAZMAT operations, the hand receipt included—

- Draeger HAZMAT and civil defense kits.
- An International Organization of Standardization (ISO) 9001 sampling kit.
- AN/VDR-2, AN/PDR-77, and AN/UDR-13 radiac sets.
- ICAMs.
- ACADAs.
- Chemical-agent monitor simulators (CAMSIMs).
- HAPSITE® portable, gas chromatograph and mass spectrometer units.
- BioCapture® air sampler units.
- HAZMAT identification systems.

To extract and transport casualties during HAZMAT operations, the hand receipt included—

- Patient litters.
- HAZMAT Decontaminable Sked® stretchers.
- Multipurpose carts.

their trade, but by the time they become experts in their field, they are promoted and trained in general leadership roles to fill higher-level positions. With a Soldier who wears the rank of a warrant officer, you have the balance of validated equipment expertise, technical skills, and leadership ability.

CBRN Warrant Officer Authorizations

We need CBRN warrant officers. We need leaders who are experts in platoon level CBRN operations and who know the limitations of their equipment. The Chemical Corps needs them, the Army needs them, and the Nation needs them! And as tragic or dramatic as it may seem, our families need them to provide protection from the threats in our world today.

CBRN specialists *will "conduct CBRN reconnaissance and surveillance; perform decontamination operations; conduct obscuration operations; conduct CBRN sensitive site exploitation; and operate and perform operator maintenance on assigned CBRN defense and individual CBRN protective equipment. Additionally, in non-chemical units, the CBRN NCO plan, conduct and evaluate individual and collective CBRN training, and provide technical advice on all CBRN operations and hazards for company and higher-level organizations. Duties for MOS 74D at each level of skill are:*

(1) MOSC 74D10. Perform as a team member in support of CBRN reconnaissance, surveillance, detection, decontamination and obscuration operations; serve as company CBRN specialist.

(2) MOSC 74D20. Supervise CBRN reconnaissance and surveillance, detection, decontamination and obscuration operations; serve as company CBRN NCO.

(3) MOSC 74D30. Lead CBRN reconnaissance, decontamination and obscuration squads, and biological detection teams; serve as battalion CBRN NCO who supervise and train company level CBRN NCOs/specialists and inspect company level CBRN readiness.

(4) MOSC 74D40. Supervise CBRN reconnaissance and surveillance, detection, decontamination, and obscuration platoons; manage operations of a chemical company; serve as the CBRN staff advisor at battalion level and higher who supervise and train subordinate level CBRN NCOs/specialists and inspect subordinate unit CBRN readiness.

(5) MOSC 74D50. Serve as first sergeant, MSGs, and SGMs; provide staff supervision; coordinate, supervise and conduct group, division, Corps and Army level CBRN operations."

—DA Pam 611-21

Revision found at <https://perscomnd04.army.mil/MOSMARTBK.nsf/>

In the Army, trade-offs must be made when a change in force structure is needed. In this case, given the no-growth policy in personnel for the Chemical Corps, we can expect to lose officer slots to gain warrant officer slots. Since a significant portion of lieutenants in the Corps are in branch-detailed positions and will be lost in two years, there is an easy answer: Replace some or all branch-detailed, lieutenant positions with warrant officer positions and, therefore, replace a known loss with a career Soldier. Of course, this is easier said than done due to the shortage that will be created in other branches down the road. But the option should be considered.

Where would warrant officers be authorized? In a perfect scenario, they would be authorized where CBRN expertise is needed: overseeing equipment in technical escort battalions; conducting covert operations with Special Forces Chemical reconnaissance detachments; operating labs in National Guard units with weapons of mass destruction–civil support teams (WMD-CSTs); training and certifying Soldiers at the U.S. Army Chemical School, Fort Leonard Wood, Missouri, or in the field; and supervising the use and maintenance of domestic-response equipment at Reserve Chemical companies and National Guard CBRNE enhanced-response force units. Unfortunately, the scenario is not perfect. The authorizations would have to come from current officer slots. Positions to consider for conversions might include one officer position per company, one or two positions per technical escort battalion, and one lieutenant position per battalion. Also, consideration should be given to adding one position to the table of distribution and allowances for WMD-CSTs.

The Trade-Off Consideration

What officer authorizations is the Corps willing to sacrifice? We would lose intelligent, hard-working Chemical officers. Though we value these officers, we acknowledge that they are known losses to the Corps when they finish their branch detail and return to their basic branch. What would we gain from Chemical Warrant Officer authorizations? We would gain Soldiers who will lead and specialize in CBRN operations and training. We would provide our enlisted Dragon Soldiers with an alternative career path than that of the traditional NCO. The optimal warrant officer candidate would be a Chemical Soldier with 8 to 10 years of experience in mid-level NCO positions. Some college level education would be beneficial, although it would not be required. To minimize additional training requirements, Soldiers with technical backgrounds would be preferred.

Conclusion

This article has outlined how the warrant officer and the Chemical Soldier can be combined to create the CBRN warrant officer. The decision to create a CBRN Warrant Officer is a major undertaking—one that requires in-depth study. This article is not based on an in-depth study, but merely submits some thoughts for consideration. With changes ongoing in the Army, all bets are off. Our leadership should consider all alternatives. Will there be warrant officers in the future Chemical Corps?

References:

FM 6-22, *Army Leadership,* 12 October 2006.

DA Pam 600-3, *Commissioned Officer Professional Development and Career Management,* 28 December 2005.

DA Pam 611-21, *Military Occupational Classification and Structure*, 22 January 2007.

Proposed CBRN Warrant Officer Description

The CBRN Warrant Officer is a self-aware and adaptive CBRN expert, combat leader, trainer, training certifier, and advisor. Through progressive levels of expertise in assignments, training, and education, the warrant officer administers, manages, maintains, operates, and integrates CBRN systems and equipment across the full spectrum of Army CBRN operations. Warrant officers are innovative integrators of emerging technologies, dynamic teachers, confident warfighters, strict training compliance certifiers, and developers of specialized CBRN teams of Soldiers.

Colonel Walk is the U.S. Army Reserve Deputy Assistant Commandant at the U.S. Army Chemical School.
Chief Warrant Officer Two McKnight is the property book officer for the 485th Chemical Battalion.

Honoring Our Fallen Dragon Soldiers



Corporal Jason Nunez
Hometown: Naranjito, Puerto Rico
Unit: 5th Squadron, 73d Cavalry Regiment,
3d Brigade Combat Team,
82d Airborne Division,
Fort Bragg, North Carolina
Killed: 25 March 2007

Specialist Eddie D. Tamez
Hometown: Galveston, Texas
Unit: 5th Squadron, 7th Cavalry
Regiment, 1st Brigade Combat Team,
3d Infantry Division
Fort Stewart, Georgia
Killed: 27 April 2007



This casualty list from the ongoing War on Terrorism was current as of the publication date.

2008 Army Deployment Excellence Award Competition

By Mr. Henry H. Johnson

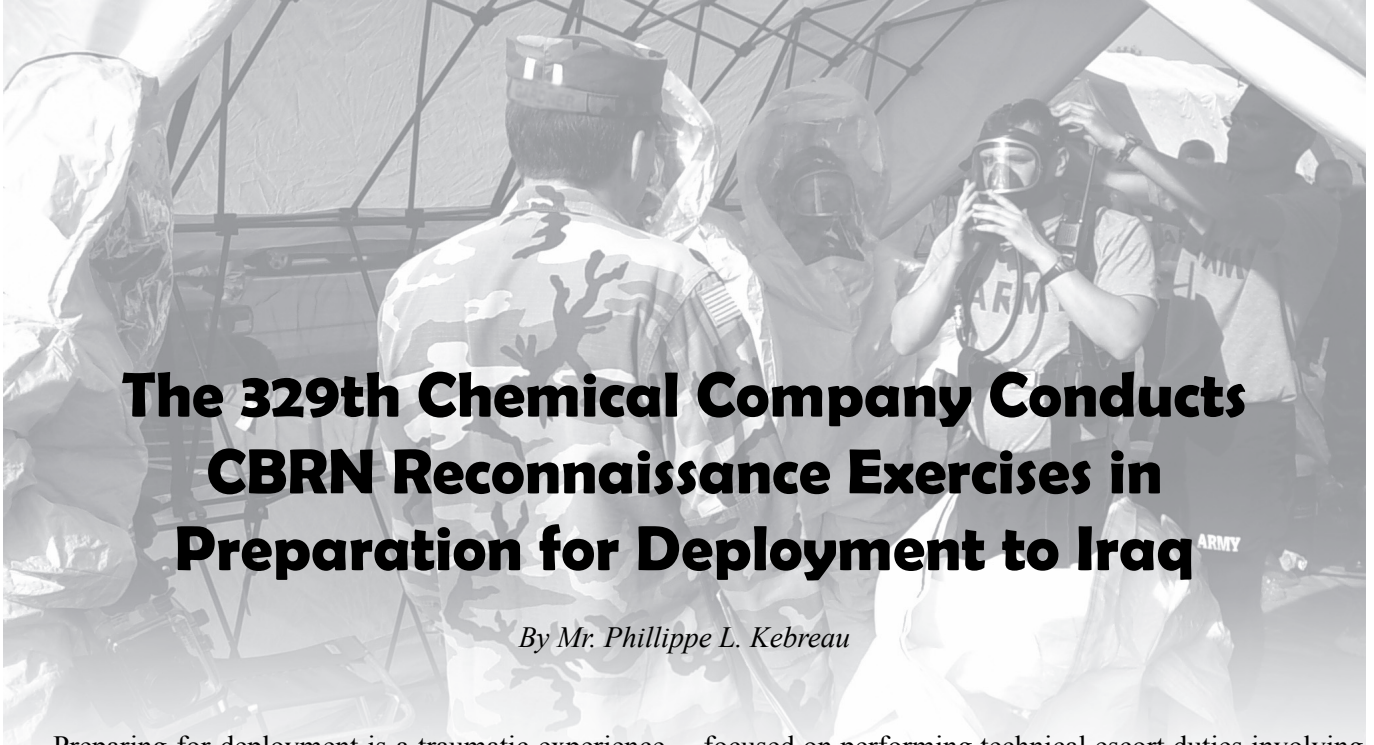
All Active Army, Reserve, and National Guard units or installations can participate in the Army's 2008 Deployment Excellence Award (DEA) competition. Participating units must have executed or supported a training or contingency deployment during the competition year. Selected winning and runner-up units in each category will send two unit representatives to Washington, D.C., for an expense-paid, four-day trip to accept the awards. The trip includes travel, per diem, lodging, and ground transportation costs; time for shopping; tours of the D.C. area; and a photo with the Army Chief of Staff. Significant dates for the competition include the following:

- 1 December 2006–30 November 2007: The 2008 DEA competition period is open for nominations.
- 1 December 2007–31 January 2008: Packet submissions are due. All packets must be submitted through the unit's chain of command for endorsements. Completed packets are then forwarded to the nominated unit's major Army command, Army service component command, or direct reporting unit.
- 31 January 2008: Nomination packets are due to the DEA evaluation board (from major Army commands, Army service component commands, and direct reporting units).
- 4–15 February 2008: The DEA board screens packets to select semifinalists.
- 28 February 2008: Semifinalists are notified.
- 3–26 March 2008: DEA teams visit selected semifinalists and conduct on-site validation of deployment practices.
- 13 April 2008: The Army G-4 selects and announces the DEA winners via a Department of the Army message.
- 3 June 2008: DEA awards are presented at the Chief of Staff, Army Combined Logistics Excellence Award ceremony and banquet. DEA guidance and evaluation criteria can be found on the Deployment Process Modernization Office Web site at <*http://www.eustis.army.mil/deploy/dea_home.asp*> .

Points of Contact for the DEA Program

Program Manager: Mr. Henry H. Johnson **<*henry.h.johnson@us.army.mil*>** **Telephone: DSN 927-1833; Commercial (757) 878-1833**

Major Command	Point of Contact	E-mail Address	Telephone
National Guard Bureau	Mr. T. J. Epps	<*tj.epps@ngb.army.mil*>	(703) 607-7434
U.S. Army Reserve Command	Ms. Susan Haith	<*susan.t.haith@usar.army.mil*>	(404) 464-8165
U.S. Army Forces Command	Ms. Kesha Daniel	<*kesha.daniel@forscom.army.mil*>	(404) 464-7821
U.S. Army Installation Management Agency	Ms. Donna Jack	<*donna.jack@hqda.army.mil*>	(703) 602-4630
Surface Deployment and Distribution Command	Ms. Towanna Brooks-Thomas	<*brooks-thomast@sddc.army.mil*>	(703) 428-2463/3266
U.S. Army Network Enterprise Technology Command	Mr. Richard A. Williamson	<*richard.williamson@netcom.army.mil*>	(520) 538-6114/8877
U.S. Army Corps of Engineers	Mr. Tommy McClain	<*tommy.mcclain@usace.army.mil*>	(703) 761-1245
U.S. Army, Europe	Major Eric Hutchinson	<*eric.hutchinson@hq.hqusaeur.mil*>	DSN 314-370-6470
U.S. Army, Pacific	Master Sergeant Paul Fisk	<*paul.fisk@us.army.mil*>	(808) 438-8641
U.S. Army Special Operations Command	Ms. LaRetta Wager	<*wagerl@soc.mil*>	(910) 432-3925
Eighth U.S. Army, Korea	Captain Luke Clover	<*luke.clover@korea.army.mil*>	DSN 315-725-8383
U.S. Army Medical Command	Ms. Tiffani Morrell	<*tiffani.morrell@cen.amedd.army.mil*>	(210) 221-6040
U.S. Army Intelligence and Security Command	Mr. Julian "Bruce" Grover	<*jbgrove@inscom.army.mil*>	(703) 806-4946
U.S. Army Criminal Investigations Command	Ms. Patricia G. Evans	<*pat.evans4@belvoir.army.mil*>	(703) 806-0329



The 329th Chemical Company Conducts CBRN Reconnaissance Exercises in Preparation for Deployment to Iraq

By Mr. Phillippe L. Kebreau

Preparing for deployment is a traumatic experience for all Soldiers. But for U.S. Army Reserve Soldiers gathering together from five locations, transforming into a cohesive fighting force presented additional challenges. Soldiers from the 329th Chemical Company were required to leave their civilian lives, ready their equipment, and attend combat training exercises in basic Soldier and survival skills (including convoy live-fire exercises and driver training).

Administrative requirements had to be completed, but the greatest challenge that the 329th faced was sharpening individual and collective special skill sets for the members of its Weapons of Mass Destruction (WMD) Chemical, Biological, Radiological, and Nuclear (CBRN) Reconnaissance Platoon. To prepare for deployment, Soldiers attended a three-week training session at Redstone Arsenal, Alabama. The training focused on performing technical escort duties involving field sampling, detection, identification, decontamination, mitigation, and remediation exercises for hazards associated with chemical, biological, and radiological materials. The platoon also attended a two-week course at the Pennsylvania Fire Academy. This physically and mentally challenging course included wearing personal protective equipment (PPE) clothing during simulated and actual hazardous conditions (emergency situations involving fire and smoke and conditions requiring Soldiers to don the self-contained breathing apparatus).



A Soldier mitigates a vapor release.

Delta Team, Civil Support Readiness Directorate, U.S. Army North, Fort Sam Houston, Texas, spent four weeks training the platoon on the tactics, techniques, and procedures for responding to WMD incidents. The training enabled Soldiers to analyze various WMD scenarios using the military decision-making process (MDMP) and to establish the best course of action based on the mission, enemy, terrain and weather, troops and support available, time available, and civil considerations (METT-TC). Delta Team also provided hands-on specialized training on hazardous material (HAZMAT) equipment from ICx™ MesoSystems, Rae Systems, Bauer Corporation, and Davis Defense Group. Soldiers from the 329th trained alongside the Orlando, Florida, HAZMAT team during the preparation phase, creating opportunities to discuss concepts and procedures with full-time HAZMAT technicians.

In its final training event, the platoon participated in detailed mission certification lane training exercises that served as a capstone for all previous training events. For the event, Delta Team coordinated with the Orlando Fire Department to obtain the best facilities for creating



A decontamination team leader checks the operability of the decontamination line.

a realistic training environment. The exercise scenario required the platoon to deploy to an incident site, link with the on-scene commander, and establish a CBRN reconnaissance command post. After the command post was established, the perimeter-monitoring team deployed to assess the hazards, establish a tentative staging area, identify a decontamination area within the hazard reduction area, and establish a hazard hotline (where possible). When the platoon main body arrived on site, the unit had 90 minutes to establish a decontamination site before entering the target area.

After the decontamination site was established, the initial-entry party entered the target area and began hazard assessment, identification procedures, and site characterization operations. Data was gathered from the site, potential sampling areas were identified, work party teams were established, and sampling plans were briefed.



The perimeter-monitoring team conducts precombat checks.

After all survey mission performance plans were completed to capture the sequence of events, list identified hazards, and note other discoveries found at the hazard site, an incident result package was presented to the incident commander (IC) for use as a legal reference of actions conducted. The team successfully accomplished all the IC's objectives and was instrumental in assisting with the critical decisions.



The IC checks the progress of the sampling operation.

Dragon Soldiers enthusiastically participated in the training events and exercise evaluations. The Chemical Officer from Central Command visited Soldiers during the training and was very pleased with what he saw, especially the professionalism displayed by all. The platoon received exceptional scores during the evaluation, with their success definitely accredited to unit preparedness. Dragon Soldiers will continue to receive specialized training in toxic industrial chemicals and toxic industrial material detection and identification procedures. These special skill sets require a higher level of thinking and increased interaction with other agencies. As the Army transitions to the next generation of warfighters, Dragon Soldiers will play a greater role in the War on Terrorism by providing support to combatant commanders in the field and to ICs at home. Our Soldiers must be prepared to face these challenges head-on!

Mr. Kebreau is the senior survey observer-controller/trainer for Delta Team, Civil Support Readiness Directorate. He is also a retired Chemical Corps first sergeant. Mr. Kebreau holds a bachelor's degree in environmental science, with a minor in homeland defense from Excelsior College in Albany, New York.



Dragon Soldiers Battle for Honors

By Mr. Christian DeLuca

Twenty-two of the top enlisted Soldiers and noncommissioned officers that the Chemical Corps had to offer made their way to Fort Leonard Wood, Missouri, in June 2007 to compete in the Third Annual Dragon's Peak Competition. The competition tested physical and mental skills over a two-day period of challenging and grueling Chemical Corps-based events.

Chemical Corps Regimental Command Sergeant Major Patrick Alston said that the Dragon Soldiers, who were selected by their unit commands based on their overall job performance, competed in the toughest Dragon's Peak to date. "Every year, the competition gets better and better," said Regimental Command Sergeant Major Alston. "These Soldiers faced major stepping stones in the competition that are putting it [the competition] in line with the best Ranger competition. These are some of the hardest-working Soldiers, Army-wise. That's why they were picked to represent their units."

The competition began at 0400 on 23 June 2007 with a physical training (PT) test that included push-ups, sit-ups, pull-ups, and a two-mile run. While carrying 35-pound backpacks, the competitors then completed a 6-mile road march to Ranges 2 and 3, where they qualified with their M16A2 rifles. Specialist Matthew Matosic, 1st Battalion, 75th Ranger Regiment, Fort Benning, Georgia, said that the road march—which took advantage of the hilly terrain of Fort Leonard Wood and the hot, muggy weather of the Missouri summer—was arduous, tiring, and . . . just how he wanted it. "It [the weather] was a smoker," Specialist Matosic said. "It [the road march] was challenging and very difficult. Plus, we did the PT test right before it. It was great!"





Following rifle qualifications, contestants completed a 2-mile road march, stopping at four checkpoints along the way to complete mission-based events, such as reacting to, identifying, and reporting a biological agent or treating a casualty under hostile conditions. The group then completed the Physical Endurance Course at Training Area 89. The course is a high-speed obstacle course where Soldiers climb; crawl; shimmy; and swing over, under, and through a number of obstructions. Staff Sergeant Travis Chipley, Headquarters and Headquarters Detachment, 3d Chemical Brigade, Fort Leonard Wood, said that the nonstop pace of the competition is what tested him the most. "Going from one event to the other with no rest in between [events]—it's very physical and very challenging. It's outstanding."

A nighttime land navigation course, where Dragon Soldiers had to locate four checkpoints, ended Day 1 of the competition. Day 2 presented more of a mental challenge, with written tests and a board of sergeants major conducting interviews that covered topics such as leadership; chemical, biological, radiological, and nuclear reconnaissance and decontamination operations; smoke operations; the Biological Integration Detection System; physical fitness; and first aid procedures.

Awards were given to the top competitors during the Green Dragon Ball on 27 June. The winner in the NCO category was Sergeant Kenneth Delano, 701st Main Support Battalion, 12th Chemical Company, Grafenwoehr, Germany. The winner in the enlisted Soldier category was Specialist Matthew Matosic, 1st Battalion, 75th Ranger Regiment, Hunter Army Airfield, Savannah, Georgia.

Mr. DeLuca is a reporter for the Fort Leonard Wood Guidon.





The Evolving Role of Biological Weapons

By Mr. Reid Kirby

Historically, the role of biological weapons has been in parity with nuclear weapons, undergoing many dynamic compromises. Interest in biological weapons initially began as an extension of chemical weapons and a logistically favorable alternative to nuclear weapons. The general belief is that interest in biological weapons wanes after a nation acquires nuclear weapons; however, this was not the case with the United States during the Cold War. During a period of nuclear scarcity, the role of biological weapons continued as an augmentation to the nuclear arsenal. After the United States acquired an adequate number of nuclear weapons, the role of biological weapons evolved to find exclusive use in large-area coverage (LAC) and controlled temporary incapacitation (CTI).

Behind the term "covert," the role of biological weapons spanned from off-target aerial spray attacks to the dirty tricks of sabotage and espionage. The third role of biological weapons—low-observable attribution (LOA)—eludes attributing an attack to an event or opponent. This role exploits the principle of surprise (verging on perfidy) and, therefore, produces the most fear in policy makers due to the possibility of anonymous biological attacks that escape retaliation.

Extension (1941–1944)

When nations began developing biological weapons after World War I, the programs were considered an extension of chemical-weapons technology. Biological weapons followed the same concepts of dosage as chemical weapons, only with greater agent potency (see Figure 1). The purpose of biological weapons retained the same intent as chemical weapons: produce mass casualties, deny terrain, and degrade performance.

Alternative (1945)

During World War II, the U.S. biological-weapons program was distinctly separate from the nuclear-weapons program. Although the programs often vied for the same scientific staff, resources were not shared due to secrecy. During a time when the feasibility of nuclear weapons was questionable, policy makers familiar with both programs were assured that biological weapons provided a logistically reasonable alternative should the nation fail to build a nuclear weapon (see Figure 2).[1]

At the end of World War II, the United States was on the cusp of a biological capability with 500-pound clusters of the Mark I 4-pound biological bomblet and the M47A2 100-pound biological bomb charged with anthrax. Although Great Britain selected several cities for Allied biological retaliatory strikes against Germany, there was no biological capability to support such plans.

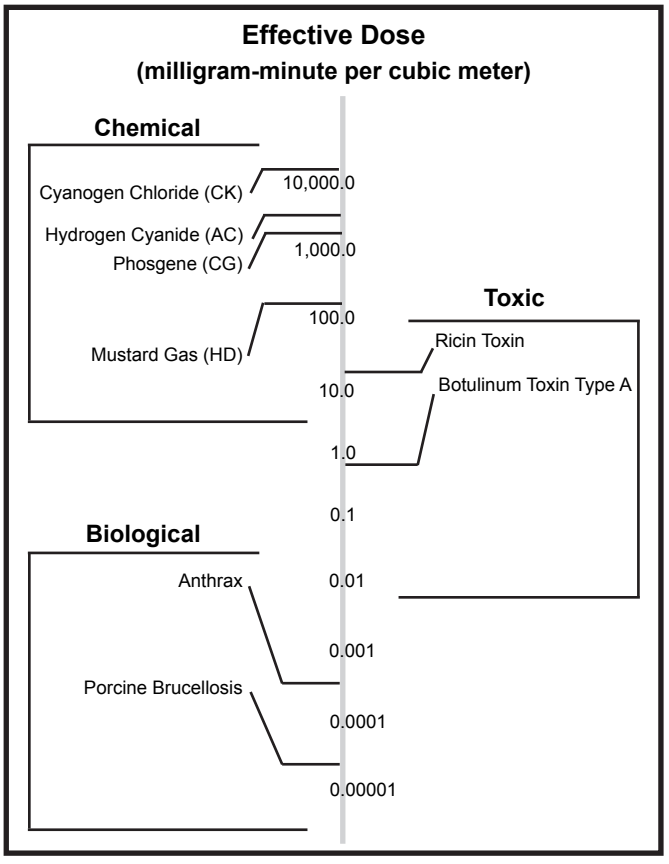


Figure 1. The effective-dosage spectrum of U.S. chemical, biological, and toxic agents during World War II

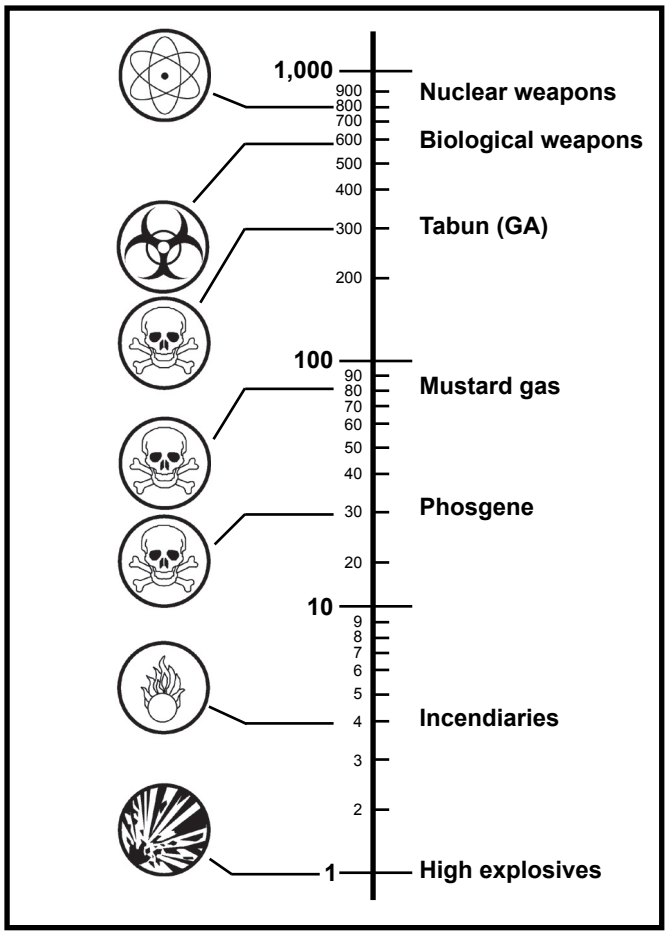


Figure 2. The comparative firepower of strategic bombardment sorties (1945–1951)

Augment (1946–1958)

During Operation Crossroads (the 1946 nuclear field trials at Bikini Atoll), the military recognized that biological weapons would have a synergistic effect if used in combination with nuclear weapons. In 1950, this possibility was affirmed by Navy research on the biological effects of radiation.

In June 1946, the United States created a war plan for nuclear strikes on the Soviet Union. Policy analysts foresaw a conflict between Great Britain and the Soviet Union, and U.S. Forces were too small to hold back a massive invasion of Soviet Forces in Western Europe and the Middle East. The plan, code-named *Pincher*, required dropping 50 nuclear weapons on 20 Soviet cities to destroy 90 percent of aircraft and armor industries and 65 percent of oil refineries. The target list gradually grew over the years (in keeping with the number of weapons in the arsenal).

Under President Harry Truman, the number of nuclear weapons in the arsenal was a closely guarded secret. Even military officials were unaware of the number of nuclear weapons available until late 1947. The actual number was underwhelming.[2] During the Pincher era, only 11 nuclear weapons were in the arsenal. Policy analysts believed that the required number of weapons to keep the Soviet Union in check was in the thousands.

After the Soviet Union detonated its first nuclear weapon in 1949, the United States issued National Security Council (NSC) Report 68, a policy study that predicted that the Soviet Union would have 200 nuclear weapons by 1954 and that an attack using half of this number would devastate the United States. The Joint Chiefs of Staff made biological weapons capability a high priority, and the U.S. Air Force put them in the same organizational level as nuclear weapons.[3] The Air Force acquired 500-pound clusters of M114 (improved Mark I) 4-pound bomblets, charged with brucellosis, from the Chemical Corps as an interim item to augment the nuclear arsenal.

Exclusivity

Interest in biological weapons waned after the number of nuclear weapons in the U.S. inventory numbered enough to saturate potential targets. The administration under Dwight D. Eisenhower started developing the Single Integrated Operational Plan (SIOP) to coordinate nuclear delivery systems. The first comprehensive plan, SIOP-62, outlined delivering 3,200 nuclear weapons against 1,060 targets throughout the Sino-Soviet block in a preemptive attack and 1,706 nuclear weapons against 725 targets in retaliation.[4] This change in strategic nuclear planning resulted in overkill, making strategic biological weapons almost irrelevant. The role biological weapons finally adopted exploited areas that other weapon systems were incapable of achieving—LAC, CTI, and LOA.

Large Area Coverage (1958–1969)

Seeking a new edge after the Soviet Union detonated its first nuclear weapon, the United States initiated a hydrogen bomb program. When a nuclear-weapon designer consulted General Curtis LeMay, Commander of the U.S. Air Force Strategic Air Command, on the requirements for a nuclear weapon, LeMay retorted "Why don't you guys make a bomb to blow up all of Russia?" The deterrent concept of the Cold War embraced total destruction of the enemy.

The United States detonated its largest nuclear weapon (15 megatons) during Operation Castle Bravo in 1954 at Bikini Atoll. Not only did the weapon have almost three times its designed yield of 6 megatons, fallout traveled off course over a larger area than estimated. If used in combat, significant thermal and blast destruction from such a weapon would have affected an area of 80 square

miles, covering an area of 50,000 square miles with serious to lethal fallout.

Around 1960, the Chemical Corps described biological weapons as capable of covering the width of a continent. A 1952 field trial with simulants demonstrated the technical feasibility of covering tens of thousands of square miles with a theoretically infective aerosol. The implications of this field trial went practically unnoticed until 1957, when the United States and Great Britain simultaneously (but independently) investigated the LAC concept.

The Chemical Corps conducted Operation LAC in 1957 and 1958. It was the largest open-air experiment series of its kind, conducted in an area over the continental United States east of the Rocky Mountains. C-119s (termed *Flying Boxcars*) flew along 1,400-mile routes, spraying 5,000 pounds of simulant over the Midwest. Sampling devices detected aerosols from as far as 1,200 miles downwind. In theory, Operation LAC demonstrated that a sortie spraying 4,000 pounds of a biological agent could infect half of the people within a 100,000-square-mile area. A single fighter sortie with a nominal armament of spray tanks was capable of covering 25,000 to 50,000 square miles with a similar casualty rate.

The LAC concept was a major change in weapon employment, even extending to on-target attacks with biological bomblets. Initially, the Strategic Air Command had a biological-capability coverage of 30 square miles per medium bomber sortie. When self-dispersing bomblets were developed, this coverage increased to 100 square miles. By the mid-1960s, improvements in biological-bomblet designs and delivery systems meant a single B-52 Stratofortress bomber with an expanded SUU-24/A dispenser and Flettner rotor bomblets could cover an area of over 10,000 square miles. Putting this example in perspective, the 120-square-mile city of Kiev required 40 nuclear weapons (two to five B-52 sorties). The LAC concept meant that biological weapons could surpass nuclear weapons in casualty potential without precisely locating concealed or hardened targets.

Controlled Temporary Incapacitation (1947–1969)

After World War II, many officers believed that strategic bombing was a mistake, especially with the United States rebuilding bomb damage in Germany and Japan. In 1947, Army Air Force Chemical Officer, Brigadier General Edward Montgomery, stated that "if it were possible to develop an agent with a very widespread effect and a persistency effect of weeks or months, the possibility of imposing our will on an enemy by political or military seizure of strategic and vital localities, personalities, or facilities might be entirely feasible. The nation which can develop the atom bomb should be capable of developing such a nonlethal running mate."

In October 1948, Major General Carl A. Brandt, Air Force Deputy Director of Requirements, outlined the Air Force position on biological warfare, requiring a weapon with temporary or permanent incapacitation and minimal postwar problems. In 1952, the Air Force changed its position and required "killer" biological weapons for strategic attacks, although the Chemical Corps continued to recognize the importance of incapacitants.

The 1958 Duer Reeves Committee urged the military establishment to adopt chemical-biological warfare, particularly nonlethal agents and agents that circumvent protective masks. A year later, Defense Research and Engineering Director, Dr. Herbert York, endorsed the findings. By this time, the Chemical Corps was investing three-fourths of its research and development budget on incapacitants. At the 435th National Security Council meeting (1960), Dr. York presented the concept of CTI. Using an array of chemical and biological agents, Dr. York stated that a 10,000-pound ballistic missile was capable of incapacitating a target more than one square mile in size (roughly equivalent to the effect of a tactical nuclear weapon). But unlike nuclear weapons, the effects of chemical and biological weapons have a controlled rate and duration of action, may not result in death or permanent debility, will not cause the destruction of material, and will not hamper force mobility due to debris.

Low-Observable Attribution (1944–1975)[5]

The U.S. Navy conducted a simulated large-scale attack on San Francisco in September 1950. The event went unnoticed by the public. Several miles offshore, a surface vessel sprayed 130 gallons of simulant. Additionally, underwater demolition teams infiltrated the dockyards and emplaced biological-aerosol generators. Around the same time, the Navy tested the E-4 mine, a submarine-delivered mine that surfaced at a preset time, generated a biological aerosol, and then scuttled itself. The trials demonstrated the peculiar covert nature of biological warfare. The enemy would not detect an attack until days later, likely upon the discovery of casualties. And even then, officials might lack evidence to locate the source.

The covert nature of biological warfare transcends its uses, from biological operations through biological crimes. LOA supplies operational security and the element of surprise. In the case of biological crimes, biological espionage, and biological sabotage, LOA extends into anonymity, making an attack indistinguishable from an act of nature rather than a specific opponent due to the

delay in casualty effects and the near nonexistent tangible evidence. Nonetheless, in cases involving bioterrorism, anonymity is counterproductive, as it does not assert the destructive reputation needed to promote a terrorist's social and/or political agenda. Additionally, the planned exploitation resulting from the use of biological weapons eliminates anonymity in military operations.

In a hypothetical situation involving an off-target spray attack of Q Fever by a stealth aircraft (where the target could be a heavily defended beachhead intermixed with civilian communities), the result would likely involve a large number of casualties but minimal fatalities (less than 1 percent). Such an attack would employ LAC and CTI, but it would also employ LOA. The defenders would be unaware that an attack had occurred until an amphibious force came ashore 14 days later, during an overwhelming outbreak of disease.

In October 1958, the Baldwin Report, a study on special biological operations, unequivocally stated that the United States was vulnerable to covert biological attacks. Personnel at Fort Detrick, Maryland, responded to the threat by creating the Special Operations Division (SOD), known as the *dirty tricks guys*. While the SOD created highly sensitive weapon systems in the Biological Warfare Program, the weapons were more tactical in nature and, therefore, not thought of as a significant contributor to biological capabilities. Nevertheless, SOD did provide the technical support to identify potential risks from LOA, including numerous field trials that demonstrated the vulnerability of critical facilities.

One device with unique LOA use was the E22 portable biological warfare (BW) generator. Due to the backpack design of the E22, Special Forces could emplace the generator upwind of a critical target, well outside of a detection security perimeter. Hypothetically, releasing an agent like shigella dysentery (a camp fever) could result in an outbreak that would bring enemy operations to a halt. Such an attack would go undetected and would lack physical evidence.

Legal and Ethical Restraints

The Geneva Protocol of 1925 was a no-first-use pledge not to use chemical or biological weapons. The Biological Weapons Convention of 1975 was an outright ban on the development, production, stockpiling, and use of biological weapons, including the transfer of such weapons to other parties. If nations respect these treaty commitments, the list of potential biological aggressors is very small. Maintaining these proscriptive norms is an essential part of biological security. Should proscriptive norms fail, there are three legal and ethical principles that may restrict the use of these weapons: distinction, discrimination, and proportionality.[6]

Distinction

Distinction is a legal concept requiring openness between combatants. Although military expertise requires secrecy and deception, distinction draws a line between perfidy and legitimate actions. LOA is an aspect of biological warfare that many define as perfidy by nature. The principle of distinction applies mostly to treachery (such as Soldiers impersonating noncombatants).

Discrimination

Discrimination requires that military operations distinguish between combatants and noncombatants. The belligerents of World War II openly bombed civilian populations, an act that, on the surface, violates the principle of discrimination. The Allies ultimately legitimated their strategic bombings as attacks on the enemy war industry, and that double effect resulted in civilian casualties. The problem with Cold War era biological warfare was the matured acceptance to target enemy war industries. As the norm exists today, there is an ethical lapse in targeting civilian workers without inflicting physical destruction of the industries themselves.

The principle of discrimination originates under the presumption of lethal force, while CTI entreaties nonlethal force toward noncombatants. The term *nonlethal* should be more appropriately termed *less than lethal*, as some fatalities are expected. Discrimination remains a valid ethical consideration.

Proportionality

Proportionality restricts the use of force in excess of what is required to attain an objective. The data from field trials demonstrates that biological weapons could effectively cover vast areas; however, the data also demonstrates poor controllability in placement, requiring a disproportionately larger area to attack a target.

Scenarios and Policies

Since World War I, the chemical and biological policies of the United States were limited to retaliation. However, the policy changed in 1956 to permit chemical and biological use when militarily advantageous. But the policy was an incomplete gesture. President Eisenhower stated that he did not intend to approve agent use but changed the policy to give appropriate prioritization to the chemical and biological programs and develop a credible

retaliatory capability. In December 1966, the White House Science Advisory Committee wrote a memorandum to President Lyndon Johnson recommending a no-first-use policy and acknowledged that civilian and military planners could not conceive a single scenario where the United States would initiate biological warfare.

When Harvard professor Matthew Meselson (working for the Arms Control Disarmament Agency) inquired on the benefit of biological weapons, his contacts at Fort Detrick could only convey one—they were inexpensive. In 1968, Dr. Meselson wrote a U.S.-centric policy paper recommending that the United States ratify the Geneva Protocol of 1925. For the United States, a nation with the financial resources to maintain a nuclear arsenal, it was counterproductive to lead the way in a weapons technology that benefited less affluent nations.

President Richard Nixon announced an end to the U.S. biological warfare program in 1969. The program was dismantled, the weapons were destroyed, and the United States ratified the Geneva Protocol of 1925 and ascended to the Biological Weapons Convention of 1975. While biological warfare invokes fear in many, as a political artifact, its use must coincide with the values of the military and political establishments. It is unlikely that a scenario for using biological weapons will gain acceptance outside a global nuclear conflict, the terminus of a protracted war of attrition, or the replacement of our current international norms with an intrepid alternative.

Endnotes:

[1]This figure is based on munitions expenditure estimates for various strategic weapons, in comparison with the Mark III nuclear weapon, on a ton-per-square-mile basis.

[2]This fact is based on the numbers of strategic nuclear weapons shown on Web site <*http://www.nrdc.org/nuclear/nudb/datab9.asp*>.

[3]The Air Force created the Biological Warfare–Chemical Warfare (BW-CW) Directorate in the Air Force Office–Atomic Testing (AFOAT), giving biological weapons the same level of priority as nuclear weapons (at least on paper).

[4]A good series of documents on SIOP 62 appear on Web site <*http://www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB130/index.htm*>.

[5]Even though the United States officially ended its biological warfare program in 1969, the Central Intelligence Agency maintained a small stockpile of biological agents for espionage use until 1975, when the agency was investigated by the U.S. Senate Select Committee to Study Governmental Operations with Respect to Intelligence Activities (also termed the *Church Committee*).

[6]International agreements prohibiting biological warfare and the principle of distinction and rules against perfidy are discussed in Ingrid Detter's book, *The Law of War,* 2d ed., Cambridge University Press, 2005. The war ethics of discrimination and proportionality, including the double-effect argument, are discussed in Michael Walzer's book, *Just and Unjust Wars: A Moral Argument with Historical Illustrations*, 3d ed., Basic Books, 2000.

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Mr. Kirby is a project manager for Bradford and Galt. 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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Chemical School Staff Ride to Shiloh

By Ms. Christy Lindberg

The U.S. Army Chemical School Commandant, Brigadier General Thomas W. Spoehr, hosted a professional development staff ride to Shiloh National Military Park, Tennessee, 10–12 May 2007. In addition to fostering an interest in military history, the staff ride enhanced professional development, team building, and current applications for the Army.

The staff ride group—45 officers and 5 subject matter experts—was divided into two teams. The Blue Group was led by Colonel Robert Walk, Deputy Assistant Commandant, U.S. Army Reserve; Ms. Christy Lindberg, Historian Assistant, U.S. Army Chemical School History Office; and Mr. Kip Lindberg, Curator of Collections, U.S. Army Chemical Corps Museum. The Gold Group was led by Colonel Leslie Smith, Commander, 3d Chemical Brigade, Fort Leonard Wood, Missouri; Mr. David Chuber, Historian, U.S. Army Chemical School History Office; and Mr. Michael Thomas Chychota and Mr. David Goebel, instructors at the Center for Army Tactics Department, U.S. Army Command and General Staff College, Fort Leavenworth, Kansas.

The first phase in the staff ride consisted of preliminary study. Each officer was assigned a commander from the Battle of Shiloh and instructed to prepare a personality profile and brief on the commander's actions during the battle. The Battle of Shiloh provided excellent examples for study, including—

- Good and bad leadership.
- Terrain importance.
- Combined arms use.

Civil War battles lend themselves well to staff rides because of their location proximity and timeless lessons on the principles of war. The Union objective leading up to Shiloh was the destruction of the Memphis and Charleston Railroad junction at Corinth, Mississippi. After successes at Fort Henry and Fort Donelson, Major General Ulysses S. Grant was given command of Union forces numbering approximately 48,000 men. General Albert Sydney Johnston was given the task of defending the western theater of operations with a combined Army of 46,000 men. The Battle of Shiloh was one of the first battles during the Civil War that showed the true cost of war in human life. The casualties from the two-day battle totaled more than 3,500—a number larger than all of the American wars combined up to that point.

The second phase of the staff ride consisted of field study. Both teams followed the timeline of the battle and discussed critical points in the fighting. The officers

presented counterpart points of view and made analyses of decisions and actions taken during the battle. Walking the actual battle terrain provided a glimpse into the past and the events at Shiloh on 6 and 7 April 1862. The areas known as *Sunken Road, Ruggles Battery Line,* and *Dill Branch* were only names in a book until the group experienced them firsthand. Was this a good location for an attack? How would you have defended this terrain? Did this position affect logistics? These were the types of questions addressed in the field phase.

During the Battle of Shiloh, the Union secured key terrain in an area known as *Pittsburg Landing*. The Confederates attempted to use the combat multiplier of surprise to direct the Union Army into a swamp area, trapping them in miserable conditions and cutting off their supply lines. After numerous attempts to turn the Union line, the Confederates lost the initiative, and the Union was able to regroup and drive the Confederates from the field.

The reward for a long day of walking the battlefield was dinner at a local hotel. The group enjoyed local cuisine and a chance to socialize and talk about the day. The next day, the group met for the most important phase—the integration phase. Each officer contributed an analysis of the battle and offered opinions on key points that could be taken away and applied to a current combat situation.

Accommodations were provided by the National Guard Armory in Corinth, Mississippi, which enabled the Chemical School to limit expenses and strengthen camaraderie. The National Park Service was also instrumental to the success of the staff ride, as were their staffs at the Corinth Civil War Interpretive Center and Shiloh National Military Park.

Ms. Lindberg is the historian assistant at the U.S. Army Chemical School History Office.

Army Reaches Chemical Weapons Convention Milestone

Army News Service, Aberdeen Proving Ground, Maryland, 19 June 2007—The U.S. Army Chemical Materials Agency (CMA) has announced the safe destruction of 45 percent of the U.S. chemical stockpile. This major Chemical Weapons Convention (CWC) milestone was accomplished well ahead of the other signatory nations with major stockpiles.

The United States came under the provisions of the CWC in April 1997. The treaty includes a destruction schedule for chemical weapons stockpiles and a system of regular inspections. A total of 182 nations signed the treaty. Thus far, a large percentage of the chemical weapons materiel destroyed in the world has been destroyed in the United States.

"We successfully met the 1, 20, and 45 percent destruction milestones specified by the treaty while maintaining an outstanding safety record," said CMA Acting Director, Dale Ormond, "It is a tribute to the United States' leadership in developing and implementing chemical demilitarization technology."

"I couldn't be prouder of the men and women of CMA and their hard work, dedication, and commitment to safety and environmental compliance. Their outstanding efforts to eliminate our chemical munitions stockpile will result in a safer environment for our citizens and people around the world," said U.S. Army Materiel Command Commanding General, General Benjamin S. Griffin.

"Each disposal operation has made an important contribution; and together, they have made the process more efficient by sharing their lessons learned. I am extremely proud of CMA and the government/industry team—a world-class team performing a world-class job," added Assistant Secretary of the Army for Acquisition, Logistics, and Technology, Claude Bolton.

Reaching the 45 percent destruction milestone brings the Army closer to its final chemical demilitarization goal of 100 percent destruction of the Nation's chemical weapons materiel. The deadline for complete destruction of the chemical stockpile is April 2012.

Note: *This article was edited and reprinted.*

U.S. Army Flamethrower Vehicles

(Part One of a Three-Part Series)

By Captain John Ringquist

Early Flamethrower Vehicle Development

During World War II, flamethrowers were transformed from infantry equipment to armored vehicle-mounted weapons designed to improve combat efficiency and increase fuel-carrying capacity. Flamethrower vehicles were highly effective at producing personnel casualties and penetrating emplacements. The heat from the flames burnt, asphyxiated, and blinded personnel while the thickened fuel rounded corners, burnt combustibles, and forced enemy personnel to close gun apertures. Flamethrower vehicles also had superior range capability, increased armor defense protection, and improved mobility.

The need to develop a flamethrower tank came in 1942. The German success in capturing Fort Eben-Emael, Belgium, with infantry flamethrowers spurred the Chief of Engineers, General Julian Schley, to request the development of flamethrowers for his engineers.[1] Flamethrower tanks had become the standard for flamethrower vehicles; the Germans and Italians used mechanized flamethrowers—Germany in Europe and Italy in Ethiopia—as early as 1938, but U.S. Forces did not use flamethrower tanks in combat until 1943. Germany (using the SdKfz 122) and Italy (using the Carro d'Assalto [light tank]) regarded the flamethrower as a successful weapon.

The development of U.S. flamethrowers started from scratch. The first flamethrower, the M1, was constructed by the Kinkaid Company (a manufacturer of fire extinguishers) and commissioned by the Chemical Warfare Service. The M1 was initially designed for use by infantry and engineer units, with no vehicle platform envisaged. However, the extreme weight of fuel and propulsion systems led to new specifications by the U.S. Department of War. Flamethrowers had to—

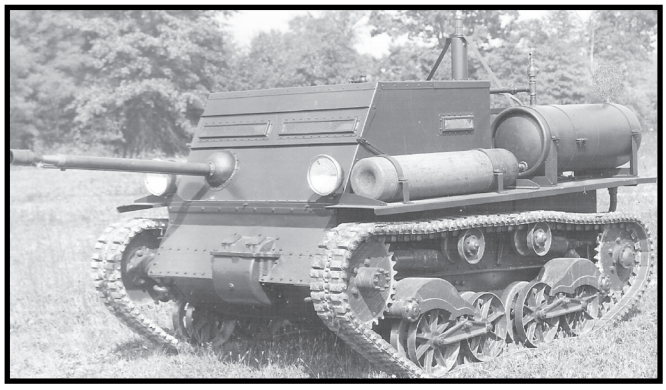
- Have a flame range of 50 yards.
- Be small enough to mount in a tank or combat car.[2]
- Use a slow-burning, hard-to-extinguish fuel that could be carried inside a vehicle or on a trailer armored to resist .30-caliber bullets.

The first mechanically transported flamethrower, the E1, was developed by the Munitions Development Division at Edgewood Arsenal, Maryland. The E1 consisted of—

- A flame gun.
- A fuel tank.
- A pressure tank.
- A regulation valve.
- An ignition device.
- An ignition fuel system (hot-wired to ignite pressurized propane that was projected by nitrogen pressure).

With a 1/2-inch nozzle and a fuel mixture (with equal parts of Number 6 fuel oil, kerosene, and gasoline), the E1 could project a 165-foot flame for 35 seconds.

Because the original flamethrowers did not have fuel tanks, the weapons were designed for transport on mortar carriers. In 1940, the E1 was paired with the Cunningham mortar carrier during testing at Edgewood Arsenal. But the carrier had no secondary armament and required an infantry escort. In June 1941, a prototype flamethrower

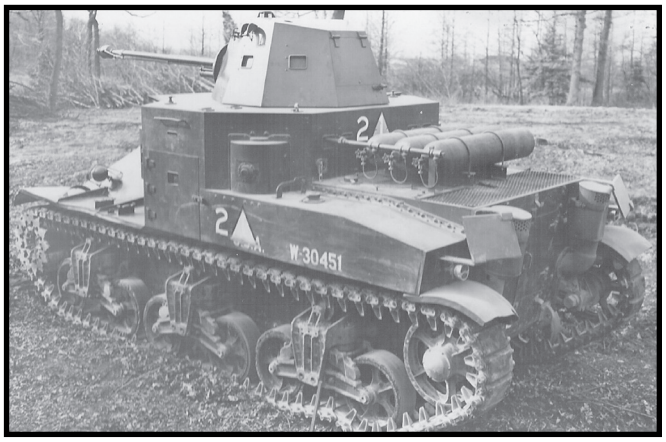


The E1 mounted on a Cunningham mortar carrier

was tested, but the results were less than impressive and the transport shortcomings were immediately obvious.[3] Apart from the dismal test performance, the lack of armored protection for the fuel and pressure tanks and the possibility of a catastrophic explosion remained serious concerns. While the initial pairing of the E1 and the Cunningham mortar carrier was not further developed, the knowledge gained was valuable as a starting point for U.S. flamethrower efforts.

In March 1941, development began on a flamethrower that could be mounted in an armored vehicle. The light tank, M2 was the first tank chassis chosen for modification. In place of a 37-millimeter gun in the turret, an E2 mechanical flamethrower was installed. The new design changes in the E2 flamethrower included—

- A nitrogen pressure cylinder.
- A pressure regulation valve.
- An electrical ignition system.

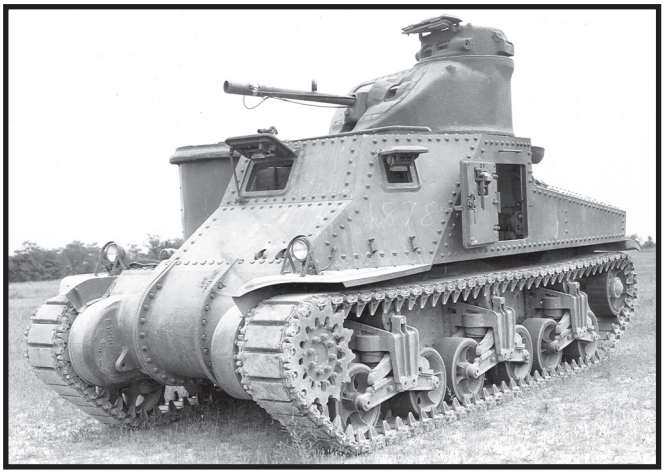


The E2 mounted on an M2

Nozzles of different sizes determined the pressure and range of the E2. With a 1/2-inch nozzle, the E2 projected a 150- to 165-foot flame for 65 seconds; with a 5/8-inch nozzle, the flamethrower projected a 186- to 210-foot flame for 42 seconds. Similar to the E1 flamethrower, the fuel and ignition system on the E2 was external and vulnerable to enemy fire. But despite system shortcomings, the E2 was influential to flamethrower development because it used an electrical ignition system and directed the flame from a turret that could be maneuvered to engage targets. However, in September 1941, field testing of the E2 revealed that seals and fuel lines were highly prone to breakdown and, as a result, the Armored Force Test Board recommended that the weapon be rejected and the expenditure of man-hours and funds be discontinued. This recommendation ended further research into flamethrower tanks until combat and demands from the field provided a new urgency for flamethrower development.

In January 1942, the Munitions Development Division began work on a main armament flamethrower vehicle. While interest in flame weapons was minor at this stage of the war, the medium tank, M3 was selected as the platform for the E3 mechanized flamethrower. The guns were removed from the tank, and the 37-millimeter gun in the turret was replaced with an E3. The 75-millimeter gun mounted on the right sponson was removed, the hole was sealed, and the space was allotted for internal storage of the 425 gallons of fuel required to operate the flamethrower. Unthickened fuels used with the E3 yielded a satisfactory 135-foot range (with a mixture of 50 percent Number 6 fuel oil, 25 percent kerosene, and 25 percent gasoline). Thickened fuels such as napalm yielded less promising results with the E3 and, as a result, the use of the mechanized flamethrower was discontinued.

Although armored flamethrower development continued at a reduced pace through World War II, combat against Japanese emplacements and fortifications in the Pacific moved the program to the forefront again. Several flamethrower designs were developed to increase fuel capacity and improve flame tank performance, leading to some unusual pairings with light tanks. The light tank, M5 was developed in conjunction with an armored trailer for use as a transport system for the E9-9 flamethrower. The trailer could transport 1,200 gallons of fuel and used a flexible connection to provide fuel for the flame gun. However, the development of this system was terminated when an explosion during testing destroyed the prototype. As a result, U.S. tanks, unlike their British Crocodile counterparts, did not use a trailer fuel system, but rather carried their fuel internally. In retrospect, the combination of the light tank, flamethrower gun, and 1,200 gallon



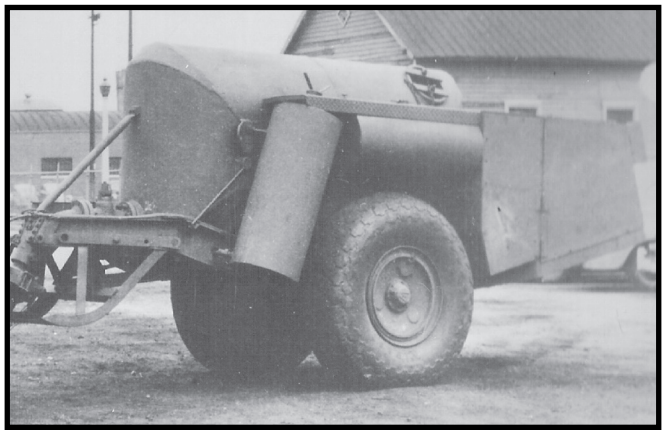
The medium tank, M3

trailer would have been unsuitable for use in the Pacific. During battles on Iwo Jima and Okinawa, Japanese attacks against the heavier armor of the medium tank, M4 were continuous. It is easy to imagine that if an E9-9 flamethrower system had been fielded, infantry personnel escorting the vehicle would have chosen to remain at a distance after witnessing its powerful explosion probability, especially against magnetic mines, satchel charges, and artillery fire.

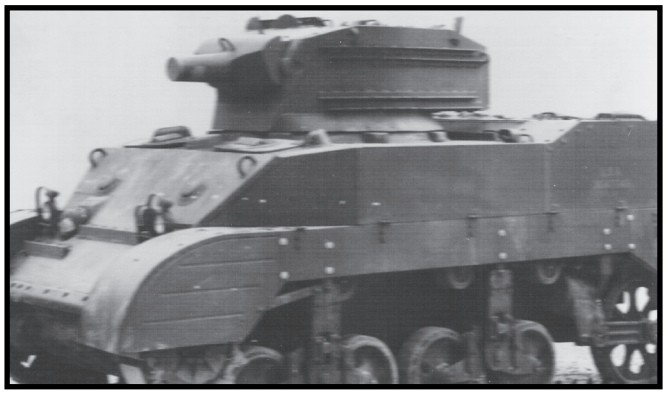
Another design that showed promise was the Q model E7-7 flamethrower (developed by Standard Oil Company in 1943). This model was designed to operate as a special-purpose main armament weapon (replacing the 37-millimeter gun) on the M5. Initial performance was promising at ranges of 120 yards (using a 1/2-inch nozzle and 7 percent napalm fuel); however, major concerns were raised about the armor shortfalls of the tank.[4] The M5 was approved for combat testing but, due to its thin armor protection, faced delays in fielding. The tank (with the E7-7 flamethrower) did not see combat until January 1945, where it was successfully employed on Luzon Island by the 6th Army.

The armored flamethrower was used heavily in the latter stages of the war in the Pacific where combat conditions were very different from those in Europe. Flamethrower tanks considered obsolete in the European theater of operations due to thin armor or small guns were employed in the Pacific.[5] In Europe, German tanks and guns destroyed Allied armored vehicles in large numbers, but the Japanese lacked offensive vehicles and weapons of the same magnitude. In the Pacific, flamethrower weapons were adapted by U.S. Forces, modified time and again, and used to destroy Japanese fortifications. U.S. armored flamethrower vehicles became the dominant flamethrower weapons in the Pacific. In contrast, Japanese efforts were few.

In 1945, Japanese flame tanks were found on Luzon. These tanks were equipped with three flamethrowers



The E9-9 armored trailer



The M5 with the Q model E7-7 flamethrower

(with the ability to project a flame 100–150 feet) and a 133-gallon fuel capacity. The Japanese used flamethrowers against U.S. Forces in 1942, but there is no evidence that these more advanced flame tanks were used in the fall of Corregidor Island in Manila Bay in 1942. U.S. Forces, lacking antiarmor weapons, would have faced a formidable threat had this tank been used against their defenses.[6, 7] However, by 1945, the armor and armament on the Japanese flame tanks were obsolete.

The flamethrower was an outstanding weapon! Few other weapons in the Pacific theater of operations were credited with saving American lives. The development of flamethrower tanks continued into 1943 and 1944, with the M4 becoming the platform of choice in the European and Pacific theaters of operation. The next development was a test in battle of a most unlikely tank, named *Satan*, on Saipan.

The Satan and the Light Tank, M3

In 1944, the conversion process to create flamethrower tanks was urgently implemented at Schofield Barracks, Hawaii, to install the E3-3 flame gun on the obsolete light tank, M3. Soldiers and Seabees modified the tanks with locally produced fuel tanks capable of holding 170 gallons of unthickened fuel. The flame gun mount on the modified tanks offered a flame projection of 180–240 feet, depending on wind and atmosphere conditions.

Twenty-four of the modified Satans were used on Saipan (assigned to the 2d and 4th Marine Divisions). U.S. Marine Corps personnel were enthusiastic about operating the Satan. In one incidence, 200 Japanese were entrenched in a cave and holding up the Allied advance. A Satan was called up and, in conjunction with machine guns, flushed the Japanese from the cave, killing 150 enemy personnel and capturing 50.

While formal modifications were being pursued in Hawaii by the Chemical Warfare Service and the Navy,

U.S. Forces in the field had a similar improvement idea: replace the .30-caliber machine gun on the bow of the light tank, M3 with an E3-3 flame gun. The Marines had experimented with the Canadian Ronson flamethrower on their amphibious vehicles, so modifying a tank with a flamethrower seemed like a logical next step. The war in the Pacific was marked by innovation, including the contributions made by U.S. Forces in the field. The flamethrower tank was very much a weapon improved by its operators.

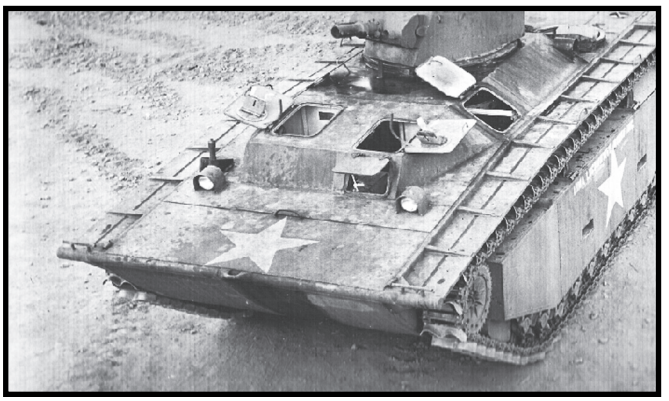
The LVT A4 and the E7-7 Flamethrower

The successful demonstrations of the E7-7 flamethrower immediately interested the Navy and Marine Corps, who were looking to arm landing craft with flamethrowers to spray beach defenses and suppress or destroy enemy defenders. The earliest armament in the landing vehicle, tracked (LVT) series was heavy machine guns; the Mark 1 (LVT A1) and Mark 2 (LVT A2) models were equipped with 37-millimeter guns in an M5 tank turret. Some LVTs even had 75-millimeter Howitzer cannons. Flamethrower guns replaced standard guns in LVT, Mark 4 (LVT A4).

The LVT A1 had eight high-pressure gas cylinders to supply fuel to an improved spark plug ignition system. The LVT A4 could carry 220 gallons of fuel internally. When fuel left the fuel tanks (pressurized at 350 pounds per square inch), it was ignited by the spark plugs. The turret (which directed the flame and projected fire a distance of 330 feet) and a small flame gun barrel were improvements



The Satan



The LVT A4 flamethrower vehicle

over previous experimental Army flamethrower models developed in the early 1940s.

The baptism for LVT A4 flamethrower vehicles came shortly after their delivery to the Navy in September 1944, where they were used during fighting on Peleliu in the South Pacific and later at Ngesebus to destroy caves and bunkers (in conjunction with the 75-millimeter armed LVT A4s, tank dozers, and infantry support). In one instance, a Marine battalion was halted by enemy fire from an extremely large blockhouse. After personnel used a tank dozer to fill in an antitank ditch, an LVT A4 flamethrower vehicle closed in to the required range and fired, resulting in 60 enemy casualties. The 75-millimeter Howitzers often did not have enough firepower to completely destroy bunkers, but the flamethrower completed the mission. U.S. Forces later discovered in Peleliu that the Japanese moved their troops around underground to reopen blocked bunkers. The use of flamethrowers disrupted the Japanese tactical strategy.[8]

Endnotes:

[1]The Chemical Warfare Service had no flamethrowers in its inventory.

[2]In 1933, under orders from Army Chief of Staff, General Douglas MacArthur, the U.S. Cavalry began developing armored vehicles. Since the National Defense Act of 1920 directed that only infantry forces could have tanks, the cavalry vehicles were called combat cars, although they looked like tanks. MacArthur required that a tank function in the traditional cavalry role of quickly raiding behind enemy lines and rapidly supporting infantry forces. These missions demanded a light, fast tank, where speed and firepower were more important than armor protection.

[3]A fuel leak ignited a fire inside the turret. The hydrogen propellant leaked fuel, creating a dribble of flaming fuel from the flame gun that set fire to the rubber track treads.

[4]At this point during World War II, the M5 was considered inadequate for close combat operations.

[5]The light tank, M3 and the thin-skinned LVT A4 operated well in the Pacific.

[6]U.S. Forces stationed in the Philippines before the fall of Corregidor Island were not equipped with flamethrowers.

[7]U.S. Forces stationed in the Philippines following the attack on Pearl Harbor were the first forces to experience the effects of Japanese flame tanks.

[8]Six LVT A4 flamethrower vehicles were used on Peleliu. Enemy casualties during the battle totaled more than 300.

References:

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The Chemical Corps Association, *The Chemical Warfare Service in World War II: A Report of Accomplishment,* Reinhold Publishing Corporation, New York, 1948.

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Captain Ringquist is commander of Company E, 3d Battalion, 10th Infantry Regiment, Fort Leonard Wood, Missouri.

Sugar-Based Smoke in Colored Grenades Protects Soldiers, Environment

By Major Keith Taylor

Army News Service, 3 May 2007—Picatinny Arsenal, N.J.—Soldiers on the battlefield use colored smoke in a variety of ways—to identify landing zones, friendly troops, potential targets, and to communicate with—but it's being overhauled to make it safer for Soldiers and the environment.

"This effort calls for removing potentially harmful dyes and other materials from smoke grenades," said Col. John L. Koster, project manager for Close Combat Systems [CCS] here. CCS oversees the Army's M18 Smoke Grenade family[,] which comes in green, yellow red and violet.

The colonel explained that as a grenade ignites, the dye inside vaporizes and condenses to form a colored cloud. The original formulation in most smoke grenades relied on a sulfur-based fuel to generate just enough heat to vaporize the dye.

"The smoke could cause a burning sensation if inhaled, and the dye residue could potentially have a harmful effect on the environment," Col. Koster added.

The colored dyes are undergoing evaluation to determine if lower toxicity dyes can be used in the grenades. Each colored grenade is an independent thermal system and has its own unique problems to solve.

However, the good news is [that] Army scientists have identified numerous possible changes which will remove the sulfur and also reduce weight and manufacturing costs.

"Our scientists came up with a sugar formation to replace the sulfur previously used in most smoke grenades employed by the U.S. military," said Col. Koster. "After rigorous testing the result was positive and today, the green and yellow sugar-based mixture versions are currently being used in the field," he said.

But scientists have found changes to the red and violet M18 smoke grenades to be more challenging. The new dyes burned instead of smoked and were not producing enough colored smoke to meet the strict military standards.

The sugar-based smoke compositions burn slightly hotter than the sulfur-based compositions, which result in the newer dyes decomposing rather than vaporizing and exiting the grenades. To keep the new smoke compositions burning long enough to produce the necessary amount of smoke, starter patches are being tested to replace the more complex pellet ignition system.

In addition, the older pellet ignition system had some reliability issues. The change to the starter-patch system makes ignition more reliable because of the increased contact with the smoke composition [,] and the intimate contact greatly increases ignition reliability at colder temperatures.

According to Col. Koster, the violet smoke grenades are nearly complete in meeting the required military standards, but additional testing and development is required to assure a high quality product for Soldiers. The M18 red smoke grenade is in the earlier stages of development and possesses additional challenges to the replacement effort.

For now, pyrotechnic experts say changes to the smoke grenade will make training and deployed scenarios safer for Soldiers as well as help protect and preserve the land on which they train and fight.

This article was published without editing changes.

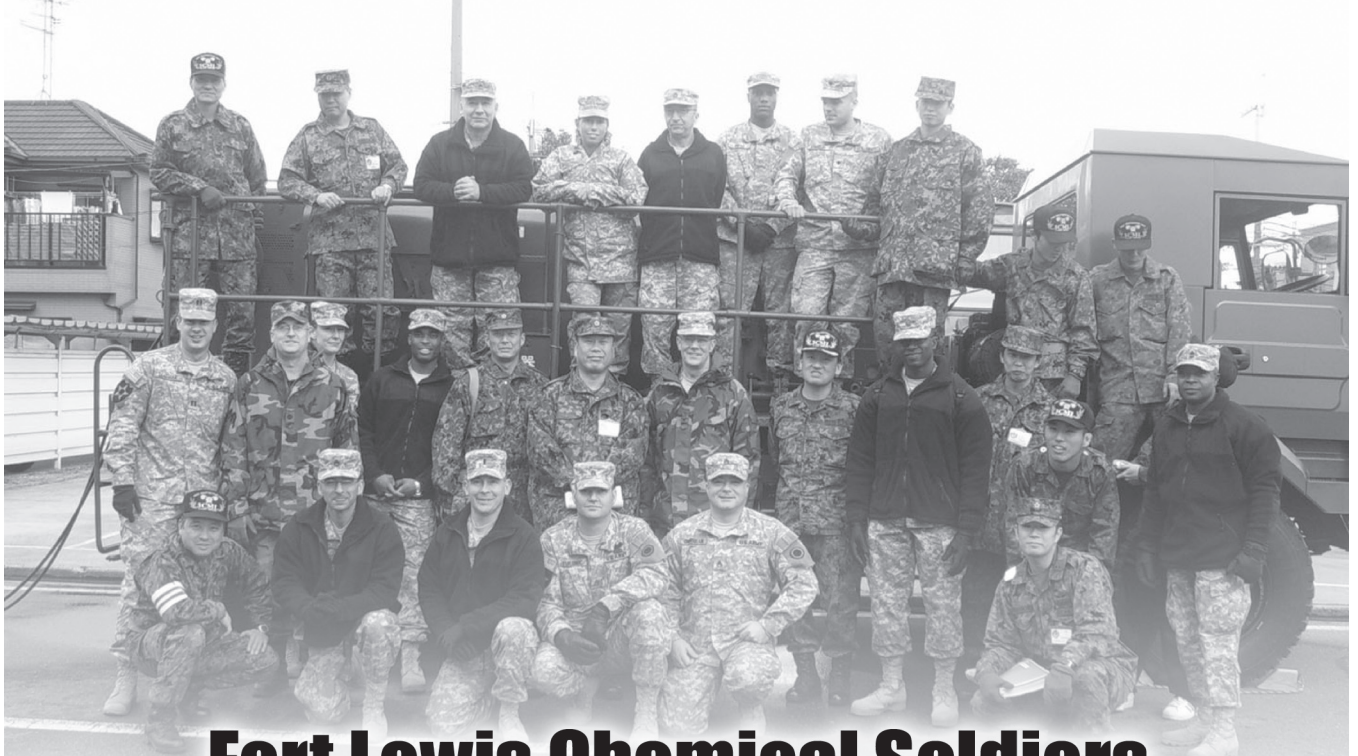
Major Taylor serves at Picatinny Arsenal.

DOCTRINE UPDATE

U.S. Army Maneuver Support Center Directorate of Training Doctrine Development Branch			
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. **Status**: Under revision FY 07.
FM 3-11.3 MCRP 3-37.2A NTTP 3-11.25 AFTTP(I) 3-2.56	Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Contamination Avoidance	2 Feb 06	An MTTP manual for conducting CBRN contamination avoidance. This revision combines Field Manual (FM) 3-3 and FM 3-3-1 into one publication. **Status**: Current.
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. **Status**: Current.
FM 3-11.5 MCWP 3-37.3 ATTP 3-1.26 AFTTP(I) 3-2.60	Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination	4 Apr 06	An MTTP manual which addresses the principles and levels of CBRN decontamination operations in a tactical environment. **Status**: Current.
FM 3-6 (FM 3-11.6) 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 and obscurants on CBRN operations. **Status**: Under revision FY 07 (will be renumbered FM 3-11.6).
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 (TIC). **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 tactics, techniques, and procedures (TTP) for employing flame weapons, riot control agents (RCAs), and herbicides during peacetime and combat. **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. **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. **Status**: Current.
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. **Status**: Under revision FY 07.
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 Chemical Knowledge Network (CKN) Web site at *<https://www.us.army.mil/suite/portal.do?$p=409522>*.			

DOCTRINE UPDATE

U.S. Army Maneuver Support Center Directorate of Training Doctrine Development Branch			
Publication Number	**Title**	**Date**	**Description**
Current Publications (Continued)			
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 weapons of mass destruction–civil support teams (WMD-CSTs), which are designed to provide support to local, state, and federal response systems. **Status**: Under revision FY 07.
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 a reference for planning, resourcing, and executing CBRN defense of theater fixed sites, ports, and airfields. **Status**: Under revision FY 07.
FM 3-50 (FM 3-11.50)	Smoke Operations	4 Dec 90 C1 11 Sep 96	An Army-only manual which provides the TTP for using smoke and obscurants to attack and defeat specific enemy targets, sensors, target acquisition systems, weapon guidance systems, and other enemy electro-optical devices. **Status**: Under revision FY 07 (will be renumbered FM 3-11.50).
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. **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. **Status**: Under revision FY 07 to consolidate with FM 3-11.6.
FM 9-20 (FM 3-11.20)	Technical Escort Operations	3 Nov 97	An Army-only manual which provides the TTP for the employment of technical escort battalions. **Status**: Under revision FY 07 (will be renumbered FM 3-11.20).
FM 3-90.15	Sensitive-Site Operations	25 Apr 07	An Army-only tactics manual which provides tactical level guidance for Army forces conducting combined arms operations in a combat zone known or suspected to contain highly sensitive enemy facilities. **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 CKN Web site at <*https://www.us.army.mil/suite/portal.do?$p=409522*>.			
Emerging Publications			
FM 3-11.24	Chemical, Biological, Radiological, and Nuclear (CBRN) Site Assessment Operations	To be determined	An Army-only manual which provides the TTP for the conduct of sensitive-site and hazardous-site assessments by conventional Army Chemical units. **Status**: Under development FY 07.
Field Manual Interim (FMI) 3-90.10	Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives (CBRNE) Operational Headquarters	To be determined	An Army-only tactics manual which provides the basic doctrine for the employment of a CBRNE operational headquarters to conduct tactical level WMD elimination operations or transition to a joint task force-capable headquarters for WMD elimination operations in support of campaigns and to support civil authorities.
NOTE: CBRN draft publications can be accessed and downloaded in electronic format from the CKN.			



Fort Lewis Chemical Soldiers Participate in YS 51

By Second Lieutenant Kristy Moore

Soldiers from the I Corps chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) cell and the 23d Chemical Battalion (Fort Lewis, Washington) traveled to Osaka, Japan, to participate in Yama Sakura 51 (YS 51). YS 51, a joint exercise for U.S. Forces and members of the Japanese Middle Army, took place 9–15 February 2007 at Camp Itami. The six-day exercise was not just a joint warfighter exercise between two countries but, rather, a unique relationship-building opportunity. And Chemical Soldiers welcomed the opportunity.[1] "For me, the exercise provided a rare opportunity to work side by side with CBRNE personnel from both the U.S. Marines and the Japanese Middle Army. I enjoyed getting to know my Japanese counterparts; and the exchange of information, ideas, and practices will definitely increase my ability to be an effective CBRNE officer," revealed an officer from I Corps. Additionally, a staff sergeant from I Corps stated that "seeing the Japanese equipment was very interesting. Some of the equipment extras they have for [decontamination] decon, we could and should incorporate into ours. I would really enjoy doing an actual decon [exercise] with them to see how they perform in the field." Soldiers were also provided the opportunity to work with U.S. Marine Corps personnel. One Soldier stated that he thoroughly enjoyed the time spent with his Marine Corps counterparts, stating that "working with . . . the Marine Corps has been an experience to see the difference in how our own services differ in their approach to decon. Where we use decon platoons, Marines are all responsible for decon." One Marine also shared, "From my personal experience, it was a pleasure working with the Army counterparts. As always, the other services underestimate the capabilities



The Japanese Middle Army nuclear, biological, and chemical reconnaissance vehicle was part of the decontamination equipment on display at Camp Soho.

that you can bring to the table. It takes working in a close environment such as this exercise to truly appreciate the caliber of our counterparts. I learned a lot in the last two weeks. I know [that] I'm going back to my parent unit with a better understanding and a lot of respect for the Army [chemical, biological, radiological, and nuclear] CBRN Soldiers . . . . There is 10 percent of Army doctrine that I cannot apply to my ethics but, in general, it has been a superb experience and, most importantly, we have learned a lot about our fellow [*sic*] CBRN Soldiers."

A social gathering allowed all Chemical parties to meet and discuss the differences in CBRNE programs. One unique opportunity included meeting Lieutenant Colonel Katumi Masaru Nakamura, Chief of the Nuclear, Biological, and Chemical Center for the Japanese Middle Army. Lieutenant Colonel Nakamura, who participated in the Tokyo subway decontamination operation, provided an incident brief, photographs of the area, and video coverage of the operation.[2, 3] Additionally, the Japanese Chemical Corps provided a tour of Camp Soho so that U.S. Forces could view Japanese decontamination and reconnaissance equipment. A participating staff sergeant regarded the tour as an "outstanding experience to see how other countries do the same tasks with different equipment."

Not all Chemical Soldiers who participated in the exercise were fortunate enough to travel to Japan. These



Personnel from the Japanese Middle Army demonstrate the front spray bar on their decontamination vehicle.



Lieutenant Colonel Nakamura explains Japanese decontamination equipment to the I Corps CBRN Officer.

Soldiers were instrumental in manning the Simulations Center at Fort Lewis. The Simulations Center personnel drive the exercise by acting as commanders and controlling troop and equipment movement on the battlefield. The instructions from the Joint Force Land Component Command provided direction for the simulated battle. When asked what the overall consensus of the experience was, Soldiers in the Simulation Center replied, "Yama Sakura was a time-consuming practical exercise that taught us how to work outside of our fields, as well as at levels we have never worked at; nonetheless, it was an overall learning experience for us all."

The YS 51 exercise was a learning experience for Soldiers—an experience that they can build on. As always, Dragon Soldiers prove that they not only do their part, but go above and beyond the standard!

Endnotes:

[1]U.S. Marine Corps personnel from the Joint Force Land Component Command also participated in the exercises.

[2]The March 1995 sarin incident was an act of terrorism against the government of Japan.

[3]Lieutenant Colonel Nakamura is considered a celebrity in the Japanese Chemical Corps.

Second Lieutenant Moore is the platoon leader for 4th Platoon, 62d Chemical Company, 23d Chemical Battalion. She has a bachelor's degree in history from Drury University, Missouri.



2006 Order of the Dragon Program Inductees

The following individuals were inducted into the Order of the Dragon Program (OODP) in 2006. 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

Master Sergeant Joseph M. Baker	Lieutenant Colonel (Retired) John (Jack) Lombardi
Chief Warrant Officer 4 (Retired) Rodney Bennett	Sergeant Major (Retired) Jimmie D. Mains
Command Sergeant Major (Retired) Robert B. Blackshear, Jr.	Lieutenant Colonel (Retired) Edward Marshall
Major Dennis J. Butters	First Sergeant (Retired) Gerald L. Mather
Mr. John W. Champion, Jr.	Sergeant First Class (Retired) Thomas Nard
Lieutenant Colonel (Retired) John D. Esce	Major General Stephen V. Reeves
Sergeant Major Gwendolyn N. Evans	Mr. Denny Seckinger
Colonel (Retired) Ronald L. Evans	Colonel Jeffrey Alan Turner
Major (Retired) Gary E. Harvey	Mrs. Belinda P. Wallace
Mr. Walter W. Hollis	First Sergeant Victor B. Whitehorn
Lieutenant Colonel (Retired) Paul James	First Sergeant (Retired) David Zapata
Lieutenant Colonel Mark A. Lee	

Honorable Order of the Dragon

Lieutenant Colonel (P) Mark T. Ahles	First Sergeant Joseph Conlon
Sergeant First Class Elizabeth Ann Allen	Sergeant First Class Mark Coovert
Master Sergeant Gabriel S. Arnold	Mr. Kevin Cox
Sergeant First Class Kendall Atterbury	Lieutenant Colonel Lisa K. Cramer
Sergeant First Class John G. Bates	Sergeant First Class Michelle R. Custard
Major Chadwick T. Bauld	First Sergeant Richard E. Davidson
Captain Steven P. Beaudoin	Sergeant First Class Curtis A. Davis
Major John Bettasso	Master Sergeant Jon Dillin
Major John J. Billings	First Sergeant Jesse Duran
Lieutenant Colonel Oliver Allen Black	Sergeant First Class Craig Warren Fields
Sergeant First Class Kyle Brinkman	Lieutenant Colonel George Frank
Sergeant First Class Steven T. Brown	Sergeant First Class Gregory D. Freeman
Mr. Anthony L. Burdell	Captain Alexander S. Fuerst
Lieutenant Colonel Joseph M. Burke	Sergeant First Class Ken Gardner
Master Sergeant Steven L. Cannon	Mr. Tim Garrett
Sergeant First Class Jose Cardozo	Lieutenant Colonel Michael Douglas Girone
Master Sergeant Carol D. Cheley	Captain Matthew Graham
Mr. David C. Chuber	Sergeant First Class Paul M. Green
Staff Sergeant Ryan P. Cole	Master Sergeant Colin Greene
Sergeant Major Michael Collins	First Sergeant Nathan James Grubb

Sergeant First Class Charles Edward Hall	Sergeant First Class Jeffrey Obermuller
Sergeant First Class Michael Hall	First Sergeant Kendall Owens II
Staff Sergeant Jeffrey Lee Hansford	Lieutenant Colonel (Retired) Marvin A. Owings
Captain James Harwell	Sergeant First Class Zachary C. Palacios
Sergeant Major James A. Hill	Major (Retired) James H. Perkins
Ms. Dorothy Horsley	Command Sergeant Major John Perry
Master Sergeant Don P. Hudgell, III	Major Michael Quinn
Master Sergeant James Micah Huling	Sergeant First Class Louis Mack Ray, Jr.
First Sergeant Ray Ippolito	Mr. Randy Reed
Master Sergeant Gregory P. Isidore	Sergeant First Class Jaime Reyes-Gonzalez
Captain Christopher J. Iwan	Sergeant Major Lewis Rivera
Major Edward M. Jagodzinski	Sergeant First Class Yusef A. Roberson
Sergeant First Class Joe E. Johnson, Jr.	Sergeant First Class Felicia Robinson
Staff Sergeant Robert S. Johnson	Staff Sergeant Michael W. Ryan
Second Lieutenant Craig L. Keller	Sergeant First Class Edward Saddler, Jr.
First Sergeant Paul King	Captain Roberto Salas
Colonel Donald Kotchman	Specialist Roberto Salas
Sergeant First Class Peiro Labib	Captain James H. Scott, III
Captain Mark J. Lavin	Sergeant First Class Alan E. Sedam
Sergeant First Class Kevin Leveille	Mrs. Sandra R. Sexton
Sergeant First Class Marvin K. Lewis	Major Connie R. Shank
Mr. Timothy Lloyd	Sergeant Stephen R. Sherman
Captain Kurt Lumbert	Sergeant First Class Darrell T. Smith
Lieutenant Colonel David L. Lynch	Lieutenant Colonel Timothy M. Snider
Major Thamar A. Main	Lieutenant Colonel Kent Soebbing
Sergeant First Class Shawn C. Mallet	Master Sergeant Bronte Stewart
Captain Isaac Manigault	Master Sergeant Paul V. Swinton
Sergeant First Class Oscar A. Manners, Jr.	Sergeant First Class Matthew Teal
Master Sergeant Gregory Martin	Mr. Timothy Tharp
Staff Sergeant Thomas M. Mathisen	Mr. Hasso von Blucher
Sergeant First Class Roger Amet Matthews	Mr. John R. Walters
Sergeant First Class (Retired) John T. McCann	Sergeant First Class Cory Walton
First Sergeant Sharon M. McCann	Captain Gary Ward
Mr. Walter Harold McCluskey	Lieutenant Colonel Terrie Sue Watts
Colonel Elbert A. McCollum	Lieutenant Colonel Jesse White
Lieutenant Colonel Daniel McCormick	Sergeant First Class Kevin White
Second Lieutenant Clancy P. McKeever	Second Lieutenant LaTarsha C. Whitfield
Staff Sergeant Michael Metzger	Lieutenant Colonel David L. Wilcox
Sergeant First Class Brian K. Mincey, Sr.	Sergeant First Class Lonnie B. Williams
Second Lieutenant Kristy Ray Moore	Staff Sergeant Jerry F. Wilson
Major Lewis M. Morgan	Captain Catrina Wright
Sergeant First Class Norman David Morrison	Lieutenant Colonel Alan L. Wylie
First Lieutenant Christopher Mullin	Sergeant First Class Mickey E. Zaun
Sergeant First Class Garland J. Murray	

Carol Ann Watson Spouse Award

Mrs. Felicia Ashley Alston	Mrs. Marisol Lin
Mrs. Rita C. Anderson	Mrs. Christine Madere
Mrs. Debbie Bolluyt	Mrs. Colleen Newing
Mrs. Denise M. Doesburg	Mrs. Cindy G. Riley
Mrs. Frances Dutchuk	Mrs. Vanedra Smith
Mrs. Linda D. Ertwine	Mrs. Kimberly R. Steele
Mrs. Audrey Friel	Mrs. Katie N. Ward
Mrs. Sarah Harvey	Mrs. Kate Watterson

2007 U.S. Army Chemical Corps Hall of Fame Inductee

By Ms. Christy Lindberg

The Chemical Corps Hall of Fame award is the highest form of recognition that the Regiment offers. This coveted award honors those who have made landmark contributions to the overall history and traditions of the U.S. Army Chemical Corps or continue to work in ways that benefit the Corps. These individuals have distinguished themselves through advances in science and technology, a lifetime of service and devotion to the Corps, or gallantry in battle. The ranks of the Hall of Fame are inundated with scientists who tirelessly worked to protect the force through innovations and Soldiers who exemplified the tenets of courage and honor. The 2007 Chemical Corps Hall of Fame inductee is Mr. Michael A. Parker. Mr. Parker was inducted into the Hall of Fame during a ceremony at Fort Leonard Wood, Missouri, on 27 June.



Mr. Parker was born on 15 May 1946 in St. Louis, Missouri. In 1968, he received a Bachelor of Science degree from the Missouri School of Mines and Metallurgy (known today as the University of Missouri–Rolla) and went on to complete graduate work at the University of Michigan and Johns Hopkins School of Engineering. Throughout his career, Mr. Parker demonstrated his ability as a farsighted leader who turned visions into innovative accomplishments. He was the driving force behind an unparalleled transformation of the Nation's chemical and biological defense capability. While recognizing the need to centrally manage the Army's chemical and biological programs, Mr. Parker developed alternative technologies to accelerate the destruction of chemical stockpiles, thus eliminating a threat with the potential to cause harm to thousands of U.S. citizens. Mr. Parker's last government position was Director of the U.S. Army Chemical Materials Agency, Aberdeen Proving Ground, Maryland.

In October 1993, an aggressive venture to restructure the chemical-biological (CB) program resulted in the establishment of the U.S. Army Chemical and Biological Defense Command (CBDCOM), Aberdeen Proving Ground. With the improved restructure, Mr. Parker maintained core scientific and engineering competencies and intensified customer focus to develop, field, and improve superior CB defense systems. He fostered an engineer- and acquisition-oriented atmosphere that delivered thirteen new chemical defense systems to our Soldiers. Additionally, by pushing for the completion of the 20,000-square-foot Biotechnology Process Engineering Facility, he aggressively improved the CB infrastructure. During his tenure at CBDCOM, Mr. Parker established the Executive Agent for Chemical Treaty Compliance, which provided the Army with the management resources needed for the federal government to meet international treaty obligations.

Mr. Parker is the recipient of the Department of Defense Distinguished Service Award, Presidential Rank Award, and Order of the Dragon. He has demonstrated extraordinary vision and leadership abilities in achieving cutting-edge reforms. Mr. Parker's lifetime of contributions reflects admirably on the Chemical Corps, and his dedicated service will have an enduring legacy for future generations.

Ms. Lindberg is the historian assistant at the U.S. Army Chemical School History Office.

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2007 Distinguished Members of the Chemical Corps

By Ms. Christy Lindberg

Four names were added to the list of outstanding individuals serving the U.S. Army Chemical Corps. The award of the *Distinguished Member of the Chemical Corps* title means that these individuals have not only served a lifetime of service in the Corps but also support the Chief of Chemical in implementing his vision of what the Corps is and where it is going in the future. The following individuals were inducted into the 2007 Distinguished Members of the Corps (DMC).



Major General John C. Doesburg (Retired)

Major General John C. Doesburg had a long, illustrious military career. Born into an Army family in Milwaukee, Wisconsin, on 15 March 1947, he traveled extensively as a child and attended schools in Pennsylvania, Texas, Oklahoma, and Germany before graduating from high school in Little Rock, Arkansas. After receiving a Bachelor of Science degree in chemistry from the University of Oklahoma, Second Lieutenant Doesburg entered the Reserve Officer Training Corps (ROTC). He later received his Master of Military Arts and Science degree from the U.S. Army Command and General Staff College, Fort Leavenworth, Kansas, and graduated from the U.S. Army War College, Carlisle Barracks, Pennsylvania.

Throughout his 34 years of service, Major General Doesburg represented the Chemical Corps around the world in a number of command and staff positions. His most recent positions included Commanding General for the U.S. Army Research, Development, and Engineering Command and the U.S. Army Soldier and Biological Chemical Command, both at Aberdeen Proving Ground, Maryland. Some of Major General Doesburg's other positions included Joint Program Manager, Biological Defense, Falls Church, Virginia; Chief, Nuclear, Biological, and Chemical Defense Division, Office of the Deputy Chief of Staff for Operations and Plans, Department of the Army; and Director, Joint Program Office for Biological Defense, Washington, D.C.



Brigadier General Patricia L. Nilo (Retired)

Brigadier General Patricia L. Nilo was born in Medford, Massachusetts. She received a Bachelor of Science degree in biology from Boston State College, a Master of Arts degree in education administration from Boston State College, and a Master of Military Arts and Science degree from the U.S. Army Command and General Staff College. Brigadier General Nilo entered the military in 1974 with a direct commission to first lieutenant in the Women's Army Corps. Detailed to the Ordnance Corps in a chemical specialty, she rebranched to the Chemical Corps in 1977. Brigadier General Nilo held numerous command and staff positions in her 30-year military career, including upper-level, nuclear-, biological-, and chemical-related staff assignments at the Pentagon. In 1999, she became the first female Commandant of the U.S. Army Chemical School. When commenting about her position as commandant, she once said: "I am very humbled by the fact [that] I was given the opportunity to do this. It is an awesome responsibility. There is nothing better than training, and there is nothing better than training young soldiers . . . to be the future leaders of the Corps." Having been commissioned as the Chemical Corps' first female general officer, Brigadier General Nilo was a strong advocate of the important roles women play. During a speech to members of an ROTC class, she conveyed that women in today's ROTC programs can go on to achieve the positions she did not have the opportunity to achieve. She closed her speech by saying, "Every person in this room brings something very special to the table while ensuring the security of this country." Brigadier General Nilo completed her military career as the Director of the Weapons Elimination Directorate, Defense Threat Reduction Agency, Fort Belvoir, Virginia.



Command Sergeant Major James E. Van Patten (Retired)

Command Sergeant Major James E. Van Patten was born on 11 September 1957 in Los Angeles, California. Command Sergeant Major Van Patten received an Associate in Arts degree from Pikes Peak Community College and was a distinguished graduate in his military training. He has continued his education through correspondence courses, logging in more than 1,200 hours to date. Command Sergeant Major Van Patten retired in 2004 with more than 30 years of service to the U.S. Army and the Chemical Corps—service which included many leadership and staff assignments. In retirement, he continues to serve his country as the Acting Chief, Planning Integration Division and Plans, Analysis, and Integration Office, Grafenwoehr, Germany. Command Sergeant Major Van Patten's awards include the Legion of Merit, Bronze Star Medal, Meritorious Service Medal, and Army Achievement Medal with four oak-leaf clusters.

As the Chemical Corps Regimental Command Sergeant Major, Command Sergeant Major Van Patten made his presence known to virtually every installation where Chemical Soldiers served. He instituted the Rite of Passage ceremony—a program still in use today—where new Chemical Soldiers are inducted into the Corps. Additionally, he was instrumental in preparing for and moving the Chemical School from Fort McClellan, Alabama, to Fort Leonard Wood, Missouri, and in developing and publishing the Chemical Soldier Professional Development Guide.

During his extensive military career, Command Sergeant Major Van Patten coached, mentored, and trained thousands of Dragon Soldiers. And he continues to do so today!



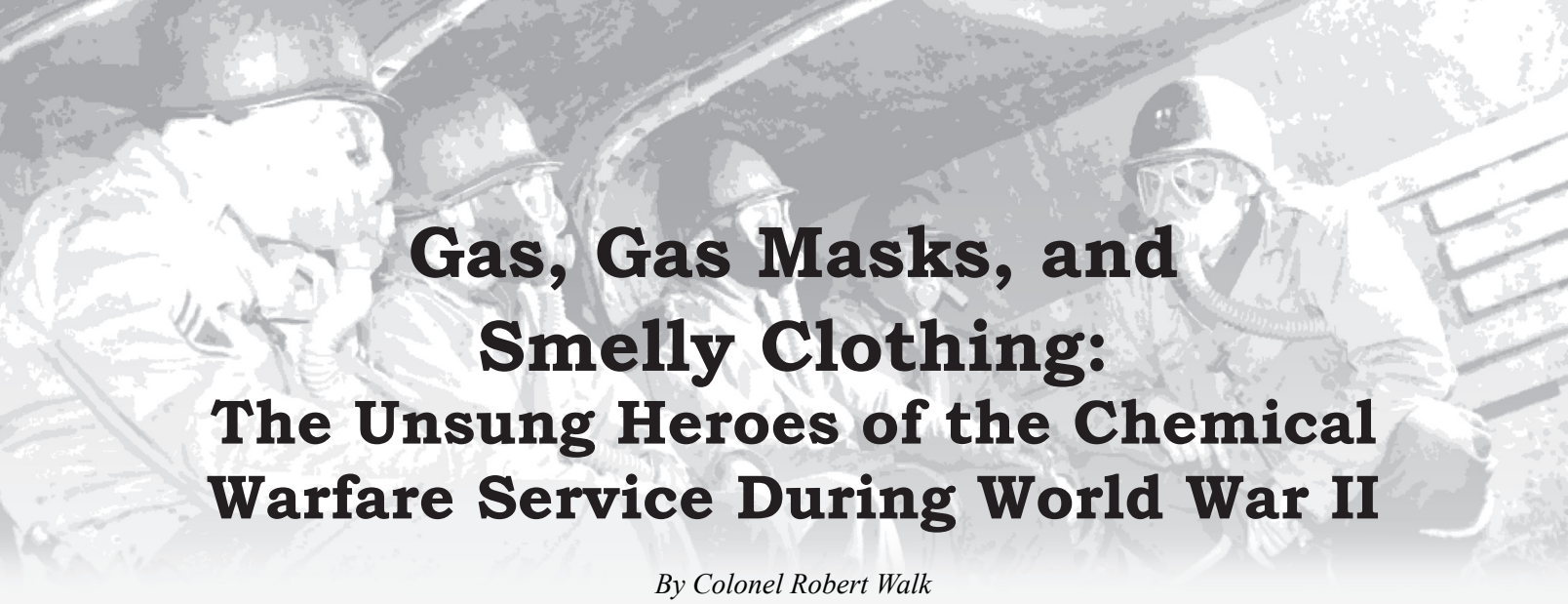
Sergeant Major Penn Wilson (Retired)

Sergeant Major Penn Wilson was born on 25 August 1938 in Greenfield, Massachusetts. He received a Bachelor of Science degree in management and a Master of Business Administration degree in finance from Jacksonville State University, Jacksonville, Alabama. He is also a graduate of the U.S. Army Management Staff College. In retirement, Sergeant Major Wilson works as the editor of the Jacksonville State University *Economic Update* and as a consultant for the Center of Economic Development at the College of Commerce and Business Administration, Jacksonville State University. He is also the treasurer for the McClellan Chapter of the U.S. Army Chemical Corps Regimental Association.

Sergeant Major Wilson began his career with the Chemical Corps as a staff sergeant after completing the Advanced Noncommissioned Officer Course (ANCOC) in 1964. In 1967 and 1968, he served in the Chemical Section, 1st Infantry Division, where he helped develop operations with the XM2 personnel detector manpack (the "people sniffer") and its conversion to an airborne detector. Sergeant Major Wilson accumulated more than 100 combat air missions in Vietnam, using the manpack to locate enemy personnel and then dropping riot control agent ortho-chlorobenzylidene malononitrile (CS) to deny them free movement and use of terrain. For this valorous service, he was awarded the Distinguished Flying Cross.

Upon returning to the United States, Sergeant Major Wilson was heavily involved in the disestablishment of the Organization and Doctrine Directorate; Combat Developments Command; Chemical, Biological, and Radiological Agency (CDCCBRA) and its merger into the Chemical School at Fort McClellan. He also worked on the consolidation of the Chemical Corps with the Ordnance Corps and its subsequent relocation to Aberdeen Proving Ground. Following his military retirement, Sergeant Major Wilson, as a Department of the Army civilian, established the Chemical School Allied Liaison and Protocol Office after chemical functions were separated from the Ordnance Corps and returned to corps status. He also reestablished the chemical force development function at Fort Leonard Wood, ensuring the effective oversight of the development process for the U.S. Army Combined Arms Center table of organization and equipment and basis of issue items. Today, he remains active in issues related to the Chemical Corps, the Army, and the Nation.

Ms. Lindberg is the historian assistant at the U.S. Army Chemical School History Office.



Gas, Gas Masks, and Smelly Clothing: The Unsung Heroes of the Chemical Warfare Service During World War II

By Colonel Robert Walk

When we hear about the mission of the Chemical Warfare Service (CWS) during World War II, history often covers the contributions of the chemical mortar battalions. While the battalions played an important part in the history of the CWS, it is also important to remember the forgotten heroes—the personnel who dealt with gas, gas masks, and smelly clothing. This article will discuss the makeup and expansion of the CWS during World War II.

Background

Prior to World War II, the CWS focused on delivery methods for chemical agents and the protection of U.S. forces from enemy uses of chemical warfare. The CWS had two regiments, and leaders expected to fill those regiments with additional personnel gained from mobilizations. During this time, mortars were only used to deliver chemical agents (not high explosives). Unit smoke operations did not yet exist. In 1939, there were 917 Chemical Soldiers in the Active Army—a small component of the total force.

After World War II began, the CWS grew in size and mission. By December 1941, there were 6,584 Chemical Soldiers. With the added responsibilities of providing incendiaries and fire bombs for the Army Air Forces and operating smoke generators, the mission of the CWS continued to grow. When Army officials realized the benefit of using the 4.2-inch mortar to provide direct support to the infantry, high explosives and smoke were added to the chemical mortar mission. By July 1945, the CWS had 64,968 Soldiers assigned. As a result, a variety of units were created to incorporate the additional personnel and added mission requirements, including—

- Three types of Chemical battalions:
  - Mortar.
  - Smoke generator.
  - Service.
- Twelve types of Chemical companies:
  - Mortar.
  - Smoke generator.
  - Aviation (air operations, depot, and maintenance).
  - Depot and base depot.
  - Maintenance.
  - Decontamination.
  - Processing.
  - Composite.
  - Service.
  - General service.
  - Laboratory.
- Chemical composite, service, and general-service platoons.

Much of the work these units performed was not glorious, but it was necessary. The Soldiers worked hard, but they received little recognition and few campaign credits. The two numbered CWS units with the longest time overseas were the 42d Chemical Laboratory Company and the 10th Chemical Service Company. In March 1942, the 10th Chemical Service Company deployed to the Southwest Pacific Area (SWPA) (as the 10th Chemical Maintenance Company) for 54 months, but its members only received one campaign credit. The 42d Chemical Laboratory Company (who, at the start of World War II, was known as the 3d Chemical Laboratory Company) spent nearly 50 months overseas in the SWPA and mid-Pacific regions supporting our forces without participating in any major campaigns. In contrast, the 82d Chemical Mortar Battalion spent 47 months in the SWPA but received three campaign credits.

Chemical Mortar Battalions

The largest units of Chemical Soldiers, the Chemical mortar battalions, dispensed high-explosive and 4.2-inch mortar fire on the enemy. These units formed the mailed fist of the CWS.

The initial organization of the Chemical mortar battalions (Table of Organization and Equipment [TOE] 3-25) included a headquarters, a headquarters company, a medical detachment, and four weapons companies. The total number of 4.2-inch chemical mortars was 12 per company (48 per battalion). Each battalion was assigned 1,010 Soldiers—36 officers, 1 warrant officer, and 973 enlisted men. The battalion structure was later decreased to 622 Soldiers (with 48 mortars) and finally adjusted to 672 (with 36 mortars). A total of 25 battalions were activated and used during the war. There were also four separate Chemical mortar companies that saw significant service during the war, one of which surrendered when the Philippines fell in 1942.

Chemical Smoke Generator Battalions

Chemical smoke generator battalions were organized as a headquarters to control smoke operations in a given area. Organized under TOE 3-266S, the battalions could operate three to eight companies in a localized area. Unlike the Chemical mortar battalions, Chemical smoke generator battalions consisted of headquarters and headquarters detachments only, with no organic companies attached. The earliest activations were in theaters of operations (not the United States), the first being in Italy in May 1944. Used most heavily in Europe and in the Mediterranean, smoke battalions controlled screening operations at ports and in forward areas. There were seven Chemical smoke generator battalions activated during World War II.

Chemical Composite and Service Battalions

As the war progressed, the need to properly command and control CWS units in the theaters of operations became a priority. In 1944, two Chemical composite battalions were formed in the Pacific to command the Chemical units there. In 1945, these units were renamed Chemical service battalions. Later, two Chemical smoke generator battalions stationed in Europe were converted to Chemical service battalions to control miscellaneous CWS units there.

Chemical Decontamination Companies

The Chemical decontamination company was designed to operate in terrain and rear area decontamination operations in the event of a massive or persistent-agent attack. These operations were known as third-echelon (or facility) decontamination operations and were performed by trained and equipped personnel. Second-echelon equipment decontamination operations were performed by unit additional-duty decontamination teams. Secondary unit missions included establishing field bathing facilities and assisting with firefighting and vehicle washing operations (using an organic truck-mounted, power-driven decontamination apparatus). The operator performed first-echelon decontamination operations on equipment.

Fifteen Chemical decontamination companies saw significant service during World War II. The companies were organized in four platoons, with three decontamination teams to each platoon. Each platoon could operate independently or as part of a larger unit. Units performed



A Chemical decontamination unit conducts operations.



A decontamination squad poses (1941).

decontamination operations using the M3- or M4-series power-driven decontamination apparatus (a 400-gallon wooden tank mounted on a standard truck chassis) or the M1- or M2-series hand-operated decontamination apparatus filled with noncorrosive decontaminating agent. Units also performed hand dissemination of super tropical bleach (alone or mixed with earth).

Decontamination methods used to clear terrain included incineration operations (burning the contaminated area) or slurry or dry-bleach applications. Terrain incineration was considered the best method due to the low personnel requirement to conduct operations. As is standard in current decontamination operations, Chemical Soldiers only decontaminated what was necessary and left the rest to break down naturally. Decontamination targets included roads, airfields, buildings, vehicles, and equipment. The M3- and M4-series decontamination apparatuses also provided shower facilities for Soldiers.

Chemical Depot Companies

Chemical depot companies provided supply support to the field Army. This unglamorous task consisted primarily of issuing chemical supplies, but it also included performing salvage operations and filling chemical munitions. These units generally established depots in the corps rear area and supply points further forward. Aviation Chemical depot companies were organized similarly but were allocated to U.S. Army Air Forces. Twenty each Chemical depot and Chemical depot (aviation) companies saw significant wartime service during World War II.

These units began the war under TOE 3-67 with an authorized strength of 184 Soldiers and ended the war with 155 Soldiers (assigned to a headquarters unit and three service platoons). Each service platoon included ammunition, toxic gas, general supply, and administrative sections. The service platoons were modular in nature and could be detached for service on specific missions in the forward area of operations or pooled to operate one large depot.

Chemical Base Depot Companies

Chemical base depot companies operated base chemical depots and chemical sections of larger base depots. Chemical base depots were located in the communications zone, far to the rear of the battle. All Chemical base depot companies were originally activated as Chemical depot companies but were renamed to reflect their location for conducting operations. The company size remained the same and included a depot headquarters, a company headquarters, a stock control unit, and a storage unit. The storage unit had three teams: ammunition, gas (chemical agents), and general supply. Sixteen Chemical base depot companies saw significant service during World War II.

Chemical Laboratory Companies

Chemical laboratory companies analyzed and evaluated enemy chemical warfare agents and determined the best methods for protection, identification, and decontamination operations. Additionally, they maintained CWS supplies to ensure that chemical warfare agents were serviceable and adequate. Company personnel also served as chemical technical-intelligence experts for theater commanders.

Chemical laboratory companies were theoretically mobile, but with 10 tons of laboratory equipment, they generally operated from one location. They were organized into a company headquarters, an analytical



Soldiers from a Chemical depot company handle mustard gas (HS).



A Soldier works in a chemical laboratory.

section (to perform inorganic analyses), an organic section (to identify chemical agents), a chemical engineering section (to construct and maintain the laboratory), and an intelligence section (to evaluate and interpret reports). The unit even included a glassblower!

Although originally authorized 86 Soldiers (14 officers and 72 enlisted men), the number of personnel in Chemical laboratory companies dropped to 58 (8 officers and 50 enlisted) in 1944, with emphasis placed on recruiting personnel with technical experience in chemistry or chemical engineering. In the Pacific Theater, personnel assigned to these companies distinguished themselves as independent thinkers and innovators by providing needed supplies and technical support to warfighters. Seven Chemical laboratory companies saw service during World War II.

Chemical Maintenance Companies

Chemical maintenance companies were designed to perform third-echelon (general support) and fourth-echelon (depot level) maintenance on all CWS equipment. Although maintenance personnel normally operated in the rear, this was not always the case. To keep the chemical mortars in operation, at least one company sent a detachment forward to provide direct support to Chemical mortar battalions. In the Mediterranean, adaptive Soldiers in Chemical maintenance companies rebuilt captured maintenance facilities to produce the parts needed for equipment repairs. In the Pacific, Chemical maintenance Soldiers waterproofed filters for amphibious assaults and explored options to use flamethrowers in the hot, wet Pacific environment. These units were originally created under TOE 3-47 with a strength of 123 Soldiers (4 officers and 119 enlisted men) and divided into headquarters, repair, and salvage platoons. By the end of the war, there were approximately 93 personnel in the headquarters gas mask repair and equipment repair platoons. Chemical maintenance companies (aviation) were organized similarly, but were allocated to U.S. Army Air Forces. A total of 5 Chemical maintenance companies (aviation) and 20 Chemical maintenance companies operated during World War II.

Chemical Processing Companies

The primary mission of Chemical processing companies was to keep permeable protective clothing serviceable and available for issue. Originally called *Chemical Company (Impregnating)*, the name was changed in 1942. The standard chemical-protective ensemble during World War II was cotton, two-piece underwear; gloves; socks; hood; coverall; leggings; and cotton gloves (for use under the protective gloves). Every piece of clothing was impregnated with solution to protect the wearer against droplets of blister agent. The lovely odor that resulted gave rise to the "smelly clothing" moniker of the companies. Additionally, the discomfort of



Soldiers from the 12th Chemical Company perform mask repairs in North Africa.



Soldiers march in protective masks (1941).

wearing the long underwear in the hot, wet environment of the Southwest Pacific had to be experienced to be appreciated. Nevertheless, the use of impregnated underwear continued until the 1980s (with the use of the M3 toxicological-agent protective [TAP] suit for depot and chemical-agent handling operations).

But what was clothing impregnation? The impregnation process was much like laundering clothing. In fact, many units provided support by laundering clothing when not treating chemical-protective gear. Additional secondary missions for these companies included supporting the theater Chemical officer with dry-cleaning, waterproofing, dyeing (often with camouflage patterns), fireproofing, mildew proofing, mothproofing (wool was used extensively in military clothing during World War II), insect repellent treatment, delousing, and sterilizing. Preparing for chemical warfare defense was so important that 39 Chemical processing companies were in service during World War II.

To perform chemical processing, the companies (organized under TOE 3-77) were aligned in two platoons totaling 146 personnel. Each platoon used the M1 (solvent) or the M2 (water) process to impregnate 500 to 830 uniforms a day. The more effective impregnation process used solvent (acetylene tetrachloride); but, even during World War II, the solvent was considered toxic and required special handling. The clothing was prepared (items such as tags or insignia were removed), impregnated, centrifuged (to remove excess solution), dried, folded, bundled in lots, and tested. Lots that failed testing were processed multiple times.

Chemical Smoke Generator Companies

Chemical smoke generator companies provided screening smoke for areas 1 to 1 1/2 miles wide and several miles long on a 24-hour basis. Organized under TOE 3-267, the companies had a headquarters platoon, an operations platoon, and six squads each. The total personnel strength was 4 officers and 131 enlisted men. Forty Chemical smoke generator companies saw significant service during World War II.

The first lightweight, mechanical smoke generator reliable enough to be fielded to the Army was the M1. Twenty-four M1s were assigned to each smoke generator company, and a squad was assigned to operate each generator. The M1 weighed 3,000 pounds and fit on the back of a 2 1/2-ton truck (for land operations) or a DUKW amphibious vehicle (for water operations).[1] Fog oil was added to the built-in tank to create a smoke screen, but the system burned about 100 gallons of oil an hour and the tank was not equipped to draw from an external source. The M1 was best used where it could be driven and parked, limiting its use on the front lines. And there were issues with its weight, bulk, and reliability, so intrepid engineers continued their work and developed the M2.

For the field Soldier, the M2 mechanical smoke generator was heaven-sent. The M2 weighed 172 pounds (making it man-portable), drew fog oil from an external source (a ubiquitous 55-gallon drum), consumed fog oil at about 50 gallons per hour, and started faster. Each operations squad operated two M2s, and the company had a total of 50 units (48 in the operations platoon and 2 in the company headquarters). Additionally, the portability of the M2 allowed for use on the front lines and increased the viability of the companies.

Initially, smoke was used to screen ports and logistical facilities, reducing the ability of the Axis powers to observe and disrupt operations through aerial interdiction. Due to the portability of the M2, smoke generator companies were used to conceal main supply routes and assault troops crossing rivers. Unfortunately, as a harbinger to the



Soldiers from the 161st Smoke Generator Company perform operations in Seine, France.



A Soldier from the 809th Chemical Company displays a gas mask in England.

current situation in Iraq, many Chemical smoke generator companies were used in other missions, especially trucking, after the reduction of the Luftwaffe in Europe.

Chemical Company (Air Operations)

The primary mission of the Chemical Company (Air Operations) was to receive, store, prepare, load, and arm chemical warfare munitions (gas, smoke, and incendiary) for delivery by aircraft. This might include operating a chemical ammunition (Class V) storage dump. A total of 54 Chemical companies (air operations) were activated during World War II, making them the largest consumer of Chemical Soldiers outside the Chemical mortar battalions. These units were assigned to Air Force wings, with one platoon per squadron, depending on the mission load. There was a greater demand for these units in the Pacific theaters of operation than in the European theaters due to the nature of the missions.

Under TOE 3-457, Chemical companies (air operations) were organized into four platoons and a distribution point, each capable of acting independently. The platoons included Soldier filling teams used to fill chemical bombs (persistent and nonpersistent). The distribution point, which consisted of 19 Soldiers, including decontamination apparatus and toxic-gas handlers, maintained Class V chemical dumps. During World War II, these units were used extensively to fill napalm and smoke tanks and prepare incendiary cluster bombs and chemical weapons for use (particularly in the Pacific theater of operations).

Chemical Composite, Service, and General-Service Companies

The primary missions of the Chemical composite, service, and general-service companies were to operate chemical supply points, provide maintenance of chemical warfare equipment, operate field laboratories, provide clothing impregnation capability in the field, and provide decontamination operations as needed. These units were originally designated as Chemical composite companies and later as Chemical service companies.

Originally organized under TOE 3-277, the Chemical composite, service, and general-service companies were authorized 200 Soldiers and provided multiple capabilities. In July 1943, TOE 3-500, Chemical Service Organization, was adopted, creating the opportunity to organize units of multiple sizes that were capable of performing all chemical services (depot, laboratory, maintenance, processing, and decontamination operations). The new modular organization allowed commanders to staff units according to specific missions. The team types were identified by the following letter designations:

A = Administrative

B = Chemical maintenance

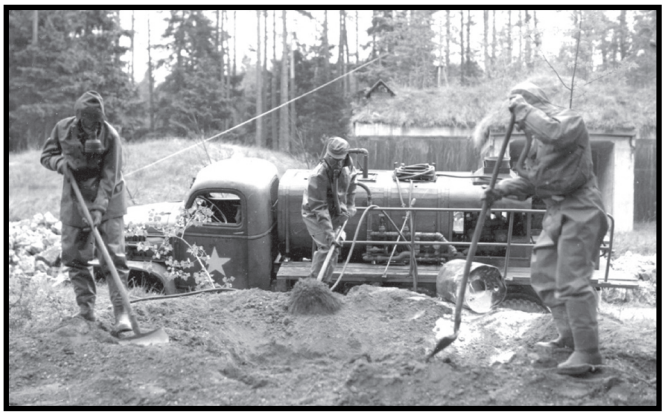
C = Chemical depot

D = Chemical decontamination

E = Chemical processing

F = Chemical laboratory

A letter designation was also used to identify the size of units. An A team was the smallest organization, and a C team was the largest. This flexible organization and modular design identification is still in use today (as in chemical, biological, radiological, and nuclear [CBRN] staff elements [JA and JB]).



Soldiers from the 140th Chemical Service Company perform decontamination operations on nerve agent tabun (GA) in Germany in 1945.

Chemical Composite, Service, and General-Service Platoons

There were 29 separate Chemical service platoons in the CWS during World War II. Some platoons were theater-created separate detachments, organized from other Chemical companies, while others were tailored units that were created based on TOE 3-500.

Discussion

What was the largest component of the CWS during World War II? Based on sheer numbers, it was the Chemical mortar battalions. However, the battalions comprised less than one-third of the total CWS strength during the war. Twenty percent of the CWS was providing direct support to the Army Air Forces with storage, maintenance, and supplies for the aerial delivery of chemical materials, including incendiaries and flame weapons. Smoke operations equaled about 10 percent of CWS missions. The majority of remaining CWS units performed missions focused on the storage and maintenance of chemical warfare supplies and equipment and combat support to infantry troops on the front line. These assorted Chemical units providing the gas, gas masks, and smelly clothing were truly the unsung heroes of the CWS.

Conclusion

The CWS was more than just Chemical mortar battalions. As the size and scope of the CWS grew during World War II, the unit composition changed to meet the needs of the Army. From the humble beginnings of delivering and defending our country against chemical warfare, the CWS expanded to include smoke operations, incendiary and flame operations, and direct infantry support (with the use of the 4.2-inch mortar). Chemical Soldiers existed to support the force and enable victory (as they do today). All of these units are part of the heritage of the Chemical Corps and are worthy of study and remembrance.

Endnote:

[1] DUKW is an Army acronym that indicates when this amphibious vehicle was designed (D) (in 1942), for what purpose (U) (utility and amphibious operations), and equipped with (K) (front-wheel drive), and (W) (two rear-drive axles).



Soldiers from the 29th Chemical Company perform a vehicle decontamination.

References:

Field Manual (FM) 3-20 (Tentative), *4.2-Inch Chemical Mortar Battalion,* October 1946.

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FM 3-25, *Chemical Laboratory Company,* 3 August 1944.

FM 3-30, *Chemical Processing Company (Theater of Operations),* 2 March 1944.

FM 3-50, *Large Area Smoke Screening,* 24 March 1944.

FM 3-55 (Tentative), *Chemical Service Organization,* December 1947.

FM 3-60 (Tentative), *Chemical Maintenance Company,* January 1948.

FM 3-65, *Chemical Depot Company,* 1 December 1944.

FM 3-66, *Chemical Base Depot Company,* 11 July 1945.

FM 3-70, *Chemical Decontamination Company,* 1 September 1944.

FM 3-75, *Chemical Company Air Operations,* 30 July 1946.

Brooks E. Kleber and Dale Birdsell, "The United States Army in World War II, the Technical Services, the Chemical Warfare Service: Chemicals in Combat," Office of the Chief of Military History, U.S. Army, Washington, D.C., 1966.

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

U.S. Army Chemical School Web Site

Do you need up-to-date information about chemical career management, courses, equipment, doctrine, and training development? All of this information and more is available at the U.S. Army Chemical School Web site. Visit <*http://www.wood.army.mil/usacmls/*> to check out this great resource.



The Lobster Battalion Reunites at Fort Leonard Wood

By Ms. Christy Lindberg

Fifteen veterans, two widows, and more than twenty-five friends and family members traveled from all over the country to meet at Fort Leonard Wood, Missouri, for the annual reunion of the 86th Chemical Mortar Battalion (the Lobster Battalion). The 86th was a World War II battalion that once served as an attachment to General George Patton's 3rd Army. Each chemical mortar battalion was given a code name starting with the letter *L* (fitting as they "lobbed" shells at the enemy, commented one veteran).

Chemical Basic Officer Leader's Course (CBOLC) Class 03-07 and Chemical Captain's Career Course (CMC3) Class 02-07 hosted a dining-out on 12 April to honor the esteemed guests. The veterans were surprised with a video presentation of the battalion's history (by the U.S. Army Chemical School History Office). Additionally, the Chemical Corps Regimental Association (CCRA) bestowed the Honorary Order of the Dragon on the 86th.[1] The CCRA also presented the Veneration Pin to family members in recognition of their loved ones' service. Mrs. Mildred Ferguson commented that "it's very nice. He [Mr. James Ferguson] has been gone for a long time now, but I know [that] he would have liked this." Darrell Honeycutt emotionally stated that "[at] most reunions, we sit around and retell the same old stories; this is a once-in-a lifetime experience. It's overwhelming."

CBOLC Class 03-07 and the 84th Chemical Battalion conducted a memorial service and wreath-laying ceremony at the World War II Memorial Chapel to remember those who made the ultimate sacrifice in battle and those who have since passed on. Several veterans wiped away tears as Taps sounded and twenty-one volleys were fired in memory of those who gave their lives for our Nation. Staff at the U.S. Army Chemical Museum unveiled a special exhibit dedicated to the service of the 86th, while the Chemical School History Office conducted interviews to record the histories of the veterans. The veterans' wives were also interviewed, and it was discovered that one wife, Barbara Sylvester, had served as an Army nurse in Italy and the Pacific, but had not received recognition for her contributions to the war effort. This was rectified when Brigadier General Thomas Spoehr, Chief of Chemical and Commandant of the U.S. Army Chemical School, presented Ms. Sylvester with the Women's Army Corps Service Medal.[2] Another wife was instrumental in assisting the Dutch underground.



Members of the 86th Chemical Mortar Battalion

The reunion concluded with a barbeque lunch and a great deal of reminiscing.

As the CBOLC officer in charge (OIC) reflected on the support that the class received from senior leadership, he added that "it all went off nicely . . . the veterans really enjoyed their night." The CMC3 OIC commented on the challenge of coordinating an event with so many moving parts. "Getting everyone on the same page and finding time in our schedules was [were] very difficult." However, the

reward was worth the effort. Veteran Eugene Bozych smiled as he said, "Thank you. This was very nice, very nice." Harold McCarty stated that "there are no words to express our gratitude for all you did to make our (*sic*) [the] 86th reunion such a memorable event. It was one of the best!"

The reunion of the 86th Chemical Mortar Battalion served as a reminder of the service of Dragon Soldiers that served before us and for those who continue to defend freedom in various locations around the world. It was an honor to show the veterans how much they are appreciated and what a privilege it is to have them as part of the Chemical Corps family.

Endnotes:

[1]The Order of the Dragon Program (OODP) was established 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.

[2]The Women's Army Corps Service Medal is awarded to women who served in the Women's Army Auxiliary Corps between 20 July 1942 and 31 August 1943 or the Women's Army Corps between 1 September 1943 and 2 March 1946.

Ms. Lindberg is the historian assistant for the U.S. Army Chemical School History Office.



Submitting an Article to Army Chemical Review



Articles must not exceed 2,000 words. Send a paper copy along with an electronic copy in Microsoft Word on a 3 1/2-inch or compact disk to *Army Chemical Review,* 464 MANSCEN Loop, Suite 2661, Fort Leonard Wood, Missouri 65473-8926 or e-mail <*leon.mdotacr@conus.army.mil*> with "Submit an Article" in the subject line.

Contributors are encouraged to include black-and-white or color photographs, artwork, and/or line diagrams that illustrate information in the article. Include captions for any photographs submitted. If possible, include photographs of Soldiers performing their missions. Hard-copy photographs are preferred, but we will accept digital images in TIF or JPG format originally saved at a resolution no lower than 200 dpi. If you use PowerPoint, save each illustration as a separate file and avoid excessive use of color and shading in graphics and slides. Please do not send photographs embedded in PowerPoint or Microsoft Word documents.

Articles should come from contributors with firsthand experience of the subject being presented. Articles should be concise, straightforward, and in the active voice. Any article containing information or quotations not referenced in the text should carry appropriate endnotes.

Include your full name, rank, current unit, and job title. Also include a list of your past assignments,

experience, and education and your mailing address, fax number, and commercial daytime telephone number. **Include a statement from your local security office stating that the information contained in the article is unclassified, nonsensitive, and releasable to the public.**

All submissions are subject to editing.

Training

Basic Chemistry for Chemical, Biological, Radiological, and Nuclear (CBRN) Responders. This Web-based, basic-chemistry distributed learning (dL) product is 50 to 55 hours long and now available online. The objective of this course is to provide students with a chemistry foundation that can be applied to their missions as CBRN responders. The chemistry portion of this courseware was developed to meet an undergraduate level of academics in basic chemistry or general science. Additionally, the course includes awareness level instruction (as defined in 29 Code of Federal Regulations [CFR] 1910.120). The final course module offers students the opportunity to test their newly learned skills and knowledge of basic chemistry using one of three randomly selected scenarios. These scenarios synthesize the roles and responsibilities of Soldiers at the awareness level and initiate an emergency response sequence. Do not let the "basic" in the course name fool you—THIS IS NOT AN EASY COURSE! All Soldiers taking the course must be prepared to work hard and take notes during the instruction (a good chemistry reference book is also helpful). This is a great course for all Soldiers, but particularly for Army Reserve and National Guard Soldiers looking to increase their knowledge of the basic science necessary for CBRN Soldiers to perform Corps missions. An effort is underway to obtain college credit for the completion of this course. Two similar products are still in development: biology and radiation/nuclear effects.

In the future, there will be a link on the U.S. Army Chemical School Knowledge Network (CKN) on Army Knowledge Online (AKO) to access the course. In the meantime, you can access it by going to <*https://atiam.train.army.mil/soldierPortal/appmanager/soldier/start?_nfpb=true&_pageLabel=rdlservicespage*> and clicking on "Login" in the upper right-hand corner. This link takes you to the Army Training Information Architecture (ATIA) individual training site where you will be asked to log in using your AKO user name and password. Select "Login to ATIA." After login is complete, click on the Reimer Digital Library *(RDL) Services* tab and type in course number "031-CBRN-1" or "chemistry" in the *Keyword* search block. After selecting the course, you will be directed to <*https://chemical.learn.army.mil*> (found at the *How to Access Product* prompt at the bottom of the course identification page), where you will log in again using your AKO user name and password through a second link (the Blackboard Learning System) to access the courseware.

Soldier Qualification Training

The Chemical School is relooking the school curriculum for military occupational specialty (MOS) 74D Soldiers. A Critical Task Selection Board was held in July 2006, and the results will be available soon. There are currently three courses being taught through six Total Army School System (TASS) battalions:

- **74D10 Military Occupational Specialty Training (MOS-T) Course** (formerly the Reclassification Course). The 74D10 MOS-T course has four phases. Phase I is offered via dL. But don't try to complete it in one weekend—it cannot be done. Phases II and IV are offered as resident training at Fort Leonard Wood, Missouri. Phase III is offered as nonresident instruction and is provided in the TASS battalion regions.
- **Basic Noncommissioned Officer Course (BNCOC).** The 74D BNCOC has four phases. Phase I is common to all MOSs. Phases II and IV are 74D-specific, resident training at Fort Leonard Wood. Phase III is 74D-specific, nonresident instruction provided in the TASS battalion regions.
- **Advanced Noncommissioned Officer Course (ANCOC).** The 74D ANCOC has three phases. Phases I and III are resident training at Fort Leonard Wood. Phase II is nonresident instruction provided in the TASS battalion regions.

The scheduled dates and times for these courses can be found by accessing the Army Training Requirements and Resources System (ATRRS) at <*https://www.atrrs.army.mil/*>.

Chemical School Knowledge Network

The CKN is up and running! Use it as your first source for CBRN information. To access the CKN, go to the Chemical School home page at <*http://www.wood.army.mil/usacmls/*> and click on the *CKN* logo in the upper left-hand

corner. You must have an AKO account to access the CKN. The information in the CKN is "For Official Use Only" and includes additional information not available on the World Wide Web. If we all work together, we can make this a fantastic CBRN resource!

Officer Training

The Reserve Component Chemical Captains Career Course (RC-CMC3) is a five-phased course. Phase I covers common-core material and is required for all captains, regardless of their component or branch designation. Phase II covers chemical technical material and is offered via dL. The U.S. Army Chemical School has successfully funded the complete revision of Phase II, and work is expected to be completed by November 2007. Phase III, a two-week resident phase at Fort Leonard Wood, Missouri, focuses on branch-specific training for conducting chemical, smoke, radiological, toxic-agent, and hazardous material (HAZMAT) operations; managing the effects of biological agents; and learning and developing defense concepts. This course now includes instruction on the Joint Warning and Reporting Network (JWARN) and HAZMAT awareness and HAZMAT operations level certification. Phase IV is the dL portion of the Combined Arms Exercise (CAX) Program. The tasks in this phase prepare officers for company command and brigade staff assignments. Phase V, also conducted at Fort Leonard Wood, is the CAX resident portion. Phase V training culminates in a military decision-making process that uses state-of-the-art battle simulation equipment. In October 2007, Military Police and Engineer students will begin training with CBRN RC-CMC3 students.

Officers transferring to the Chemical branch after attending another branch's officer basic course must attend the CBRN Defense Course to provide them with basic CBRN defense training. Other required training will depend on the officer's level of education. Contact RC personnel at the Chemical School for specific details (see the last paragraph of this article).

Army Reserve- and National Guard-Specific Training

Civil Support Skills Course. The Chemical School continues to provide National Guard Soldiers and Airmen initial weapons of mass destruction–civil support team (WMD-CST) training. The course is eight weeks long and covers training in HAZMAT, site entry, sampling, and survey operations and practical exercises.

Domestic-Response Reconnaissance Training. The Chemical School offers the CBRN Responder Course. This intensive, 2 1/2-week course provides certification training in HAZMAT awareness, mission operations, and technician sampling and entry operations. The course includes training on the self-contained breathing apparatus (SCBA), MultiRAE Combustible Gas Indicator/Detector, and colorimetric tubes. The course is open to Army Reserve Soldiers, Army National Guard CBRN enhanced-response force package (CERFP) Soldiers, Active Army CBRN Soldiers, and Army civilians with a professional requirement for the training.

Mass-Casualty Decontamination Training. In the second quarter of Fiscal Year (FY) 2007, the Chemical School will pilot the mass-casualty decontamination training program to expand the original domestic-response casualty decontamination training program and ensure that the necessary certification training is covered. This course is available to Army Reserve and National Guard CERFP Soldiers. It expands on the original Army Reserve Domestic Response Casualty Decontamination training program to ensure that it covers necessary certification training. It is expected to be an intensive, 10-day training session. More information will be published as it becomes available.

Chemical School Personnel Issues

There are currently six authorized Active Army Reserve positions—the deputy assistant commandant–Reserve Component (DAC-RC) (an Army Reserve colonel position), the deputy assistant commandant–National Guard (DAC-NG) (an Army National Guard lieutenant colonel position), two training developers (Army Reserve major and master sergeant positions), and two combat developers (Army Reserve lieutenant colonel positions) (one of these lieutenant colonels is currently serving as the Director of the Incident Response Training Detachment in a temporary assignment).

The Army Reserve has twenty authorized drilling individual-mobilization augmentee (DIMA) positions in the Chemical School—twelve officer slots (captain through lieutenant colonel) and eight noncommissioned officer slots (sergeant first class through sergeant major). Our mission is to expand school training capabilities during mobilizations. The Army Reserve currently supports the RC-CMC3 training mission. Our goal is to achieve 100 percent coverage of authorized instructor positions with qualified personnel. We strive to improve CMC3 and RC-CMC3 training through our work. We are always looking for qualified Soldiers to fill these positions, so contact us if you are interested!

For additional information, contact any of the following personnel at the Chemical School:

Colonel Robert Walk (DAC-RC), telephone (573) 563-8050, e-mail <*robert.d.walk@us.army.mil*>.

Lieutenant Colonel Christian Van Alstyne (DAC-NG), telephone (573) 563-7676, e-mail <*christian.vanalstine @us.army.mil*>.

Master Sergeant Robert Wheat (ARNG NCO), telephone (573) 563-7667 e-mail <*robert.a.wheat@us.army.mil*>.

Ms. Sandy Meyer (DAC-RC secretary), telephone (573) 563-6652, e-mail <*sandy.meyer@us.army.mil*>.

Chemical Corps Regimental Association

2008 Nominations for the Hall of Fame and Distinguished Member of the Corps Honors

Order of the Dragon

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.
- **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.

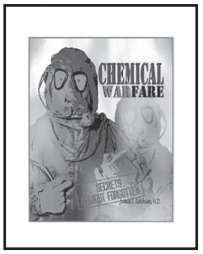
For nomination criteria and submission requirements see <*http://www.chemical-corps.org/honors*>. Nomination packets should be sent to:

Commandant
U.S. Army Chemical School
Regimental Historian
ATTN: ATSN-CM-CS-H
Fort Leonard Wood, MO 65473-8926

All packets must arrive before 5 May 2008. For more information, call (573) 563-7339 or e-mail <*david.chuber @us.army.mil*> or <*christy.lindberg@us.army.mil*>.

Book Reviews

By Mr. Reid Kirby

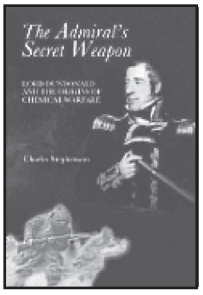


Chemical Warfare Secrets Almost Forgotten, James S. Ketchum, MD, self-published, 2006.

First person narratives are usually not worthwhile reading. But this book is an exception! This self-published book has the aesthetics of a high school yearbook, with numerous illustrations and photographs in the layout. It is a detailed account of the career of Colonel James Ketchum (U.S. Army Retired), a military surgeon in the Chemical Corps psychochemical program.

This book is a significant contribution to Chemical Corps history. In 1978, because of a potential conflict of interest, medical defense research was separated from the Corps and, consequently, from the command historian at Edgewood Arsenal, Maryland, leaving few to tell the history of these researchers. Dr. Ketchum recounts the research, people, and events of the medical laboratories at Edgewood Arsenal, describing the actions of such figures as Colonel Douglas Lindsey, Specialist Ephraim Goodman, and Dr. Frederick Sidell.

Chemical Warfare Secrets Almost Forgotten is also an excellent resource on the effects of incapacitating chemical agents, with firsthand accounts of human exposure to lysergic acid diethylamide (LSD), 3-quinuclidinyl benzilate (BZ), and other agents. In this respect, the book is narrowly focused on agent medical research, rather than other areas in the psychochemical program. The underlying conflict in this book is Chemical Corps research experiments using human volunteers and the questionable research activities of the Central Intelligence Agency (such as LSD research on unwitting victims).



The Admiral's Secret Weapon: Lord Dundonald and the Origins of Chemical Warfare, Charles Stephenson, Boydell and Brewer, 2006.

It is a well-known fact that Thomas Cochrane (later known as Lord Dundonald) planned to use stink ships loaded with burning sulfur to reduce the fortifications at Sevastopol during the Crimean War (1853–1856). What is less known is how the agent idea developed and how the British government debated carrying out the attack. Charles Stephenson, using family archives, completes the missing historical facts.

Bold, courageous, and brash, Thomas Cochrane was a brilliant naval tactician. In the Napoleonic wars, he gained fame for setting French ships ablaze with fire ships. Cochrane devised the concept when the British Navy blockaded the bottled French fleet, embarking on a lifelong quest to gain acceptance for the use of this early form of chemical warfare.

The Admiral's Secret Weapon is well illustrated and details numerous proposals in history to use chemical warfare, including the War of 1812 and World War I (before Germany used chlorine in Ypres, Belgium, in 1915). This book is uniquely Anglocentric (written for a British audience). The revelations in this book show that the main limitations to the British initiating chemical warfare were the fear of other nations adopting similar techniques and a lack of scientific evidence to support chemical effectiveness. Far from a curiosity, the concept of warfare agents received serious consideration. This book details the difficulty of adopting a weapon before its time.

Mr. Kirby is a project manager for Strategic Staffing Solutions (S3). 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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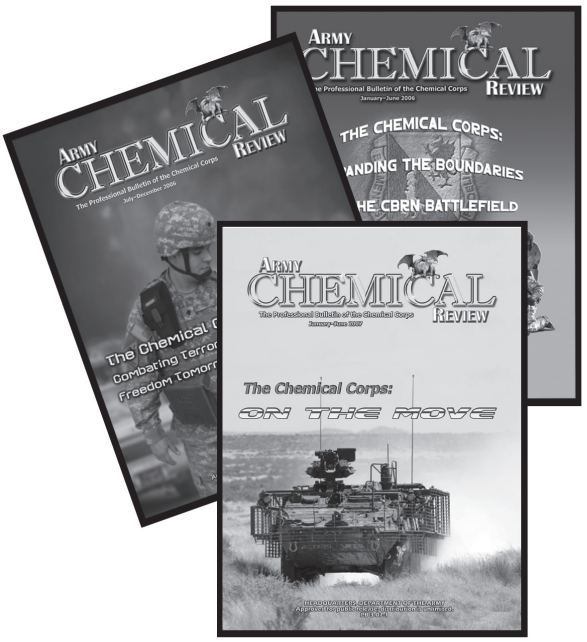
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2007 Writing Contest

Each year, the Chemical Corps Regimental Association sponsors a writing contest to stimulate thinking and writing on issues of interest to the Chemical Corps. The contest is open to military personnel in all branches and services, including allied nations, and civilians of any nationality. The topics for the 2007 writing contest are—

- **The Chemical Corps Vision.** Visions, if they are successful, give us a positive, achievable view of our future. We have such a Vision (see page 2). Now, how should we go about achieving it? What should come first?
- **Chemical, biological, radiological, and nuclear (CBRN) reconnaissance functions in the contemporary operational environment.** Describe how CBRN reconnaissance functions promote success in support of protection warfighting functions during full-spectrum operations. Present the key and essential staff functions (from battalion through Army echelon levels) using a modular model. Illustrate the similarities and differences at each echelon, and determine how staffs at each level support the Army operations process (plan, prepare, execute, and continually assess). Present CBRN unit capabilities from team to brigade levels. Describe the CBRN unit commanders' roles for CBRN reconnaissance and address the unit commanders' integration with supported commanders' staffs and joint force command operations. Finally, compare and contrast CBRN reconnaissance capabilities and responsibilities among various full-spectrum operational themes (major combat operations [offense and defense], stability operations, and civil support operations).
- **Transformation from CBRN to chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE).** Describe the entire range of chemical, biological, and radiological hazards and how they relate to terms such as *nuclear, biological, and chemical (NBC)* and *CBRN.* Present arguments for changing our fundamental focus from NBC to CBRN. Propose a definition and descriptive discussion on CBRN hazards. Using this foundation, describe what is necessary to expand the scope of hazards from CBRN to CBRNE. What is the impact on Army organizations at various echelons? Are there existing organizational models that may serve as a baseline for future Army capabilities? Present arguments to compare and contrast a CBRN hazard focus against an expanded CBRNE focus.
- **Capabilities and manpower requirements in the infantry brigade combat team (BCT) organic CBRN reconnaissance platoon.** Using lessons learned from Operations Iraqi Freedom and Enduring Freedom, the Chemical Corps recognized a capability gap in the ability of general-purpose CBRN units to assess the full range of hazards (particularly the ability to assess sensitive-site areas). The organic CBRN reconnaissance platoons in the initial brigade combat teams (IBCTs) are extremely limited in their ability to provide adequate dismounted CBRN reconnaissance support to the BCT. The platoon transport platform also offers inadequate survivability protection. A 2006 limited-objective experiment resulted in the determination that IBCT reconnaissance platoons could better provide commanders with CBRN hazard assessment analyses if they were equipped with a Joint CBRN Dismounted Reconnaissance System (JCDRS). The information gained from the JCDRS would determine if a hazard warrants further exploitation, can be mitigated using organic assets or with help from force-pooled CBRN units, or should be abandoned. An analysis is still needed to determine if the IBCT CBRN reconnaissance platoon is properly organized with eight personnel, two wheeled vehicles, and a dismounted commercial, off-the-shelf (COTS) CBRN reconnaissance system with a Level B protective ensemble for detection, identification, and limited sampling. Do platoons need a Level A capability? Can a small, eight-man platoon maintain training proficiency for Level A requirements? Can an IBCT fund sustainment training and equipment maintenance? Will eight personnel be enough to adequately provide site assessment, command and control, search, and support functions (including emergency extraction and limited decontamination operations)?

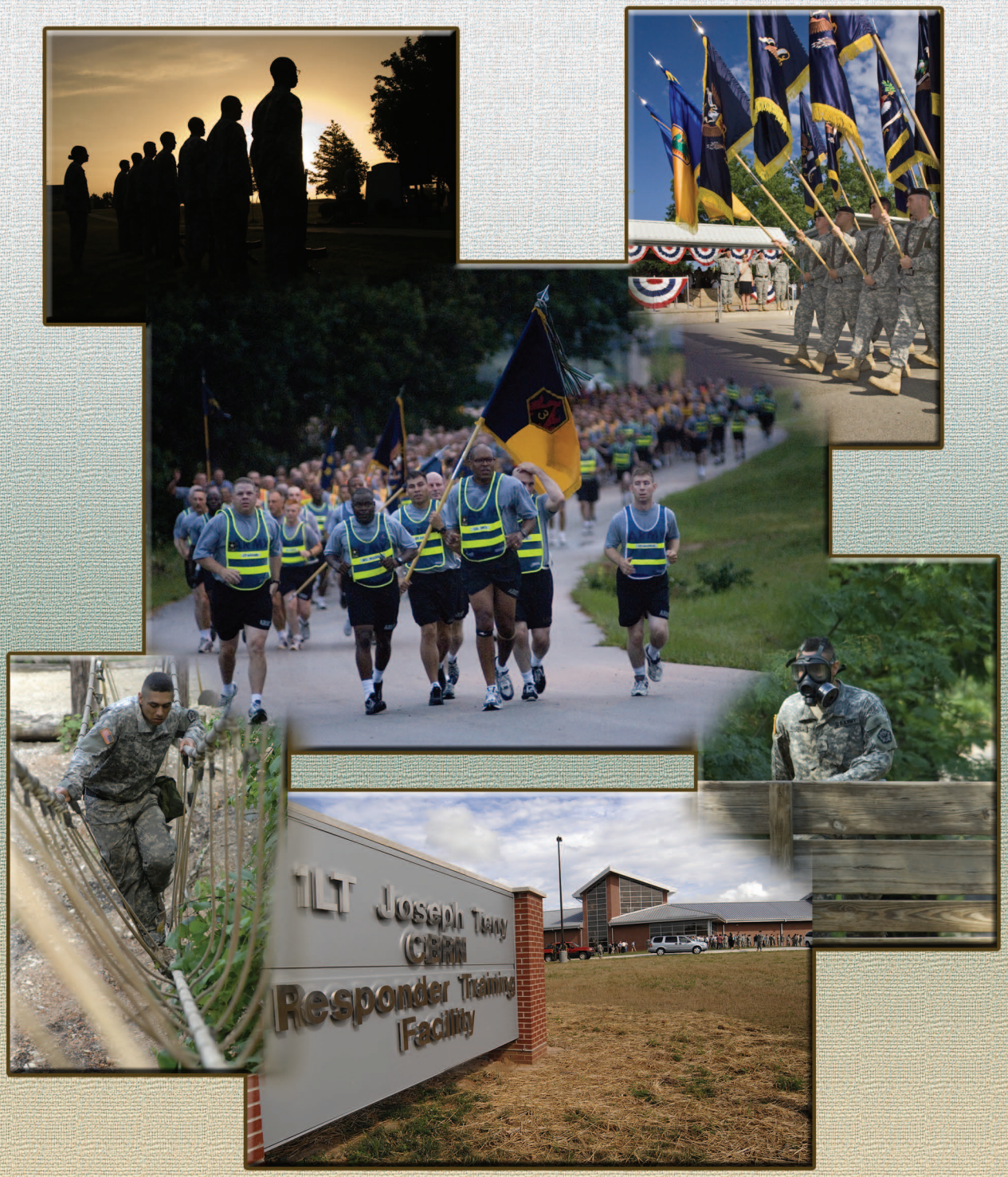
All articles should be submitted as a double-spaced paper manuscript accompanied by a compact disk containing the file in Microsoft Word format. All articles should contain 500 to 2,500 words and include the appropriate footnotes, bibliography, and graphic support. Hard copy photos are preferred; however, if digital photos are submitted, they should be saved at a dpi/ppi of 200 or more and at 100 percent of the actual size. All submissions should include a cover sheet with the author's name, title, organization, mailing address, and short biography. To ensure anonymity in a selection process, the author's name should not appear in the manuscript itself. The selection panel will rank submissions on a 100-point scale, with up to 40 points assigned for writing clarity, 30 points for relevance to Chemical Soldiers, 20 points for general accuracy, and 10 points for originality. The deadline for submissions is **2 January 2008**. Please forward your submissions to—

Mr. David C. Chuber, Chemical School Historian
401 MANSCEN Loop, Suite 1041
Fort Leonard Wood, Missouri 65473-8926

The authors of the winning articles will be awarded the following:

First place, $500
Second place, $300
Third place, $150

For additional information, contact Mr. Chuber at—
Telephone: DSN 676-7339; Commercial (573) 563-7339; e-mail: <*david.chuber@us.army.mil*>



PIN: 084109-000