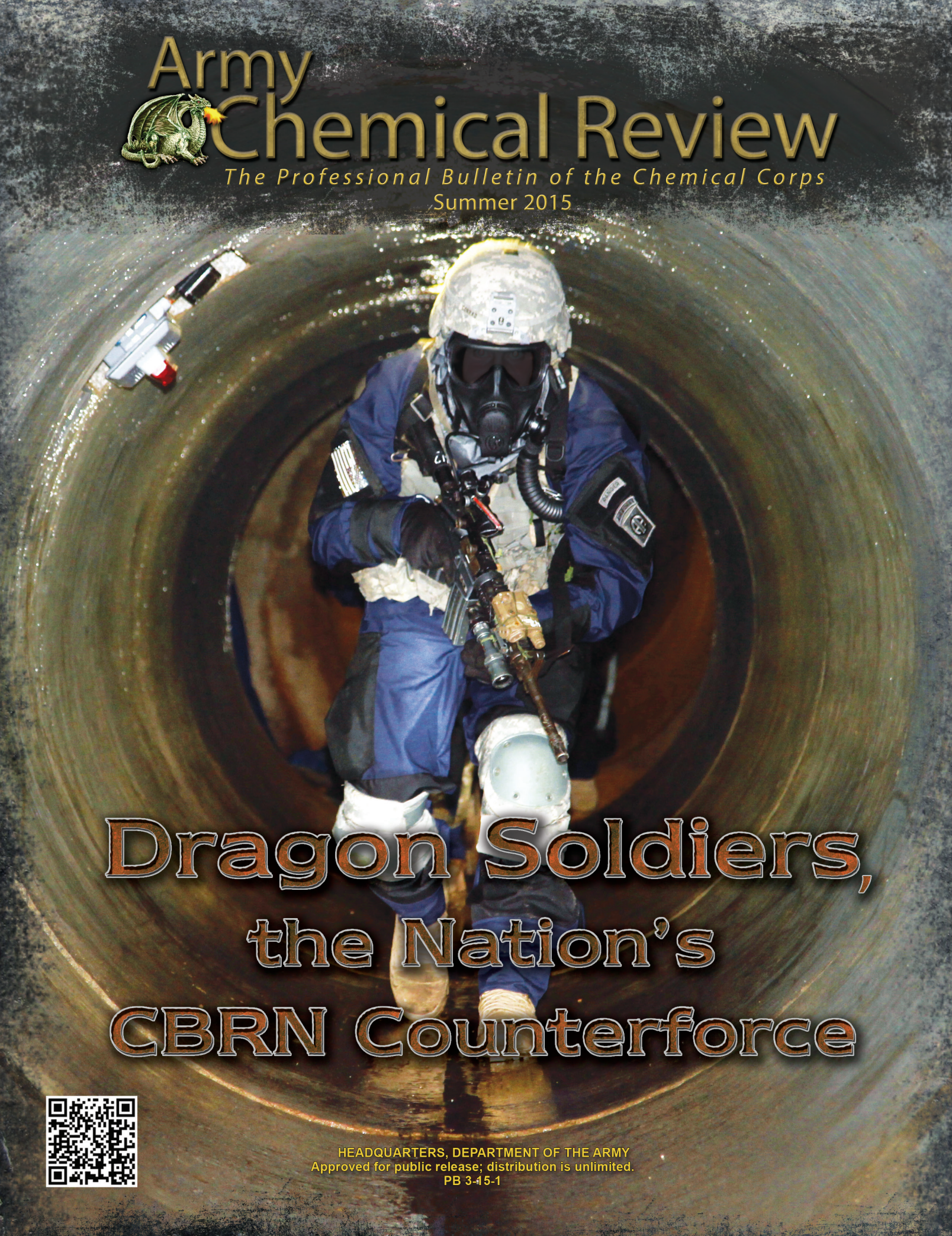
Army Chemical Review

The Professional Bulletin of the Chemical Corps

Summer 2015



Dragon Soldiers, the Nation's CBRN Counterforce

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U.S. Army
Chemical, Biological, Radiological, and Nuclear School
(573) XXX-XXXX
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COMMANDANT
BG Maria R. Gervais **563-8053**
<maria.r.gervais.mil@mail.mil>

ASSISTANT COMMANDANT
COL Scott D. Kimmell **563-8053**
<scott.d.kimmell.mil@mail.mil>

CHIEF OF STAFF
VACANT **563-8052**

REGIMENTAL COMMAND SERGEANT MAJOR
CSM Kenneth J. Kraus Jr. **563-6133**
<kenneth.j.kraus.mil@mail.mil>

REGIMENTAL CHIEF WARRANT OFFICER
CW2 Matthew D. Chrisman **563-8051**
<matthew.d.chrisman@mail.mil>

TECHNICAL DIRECTOR
Mr. Peter G. Schulze **563-8132**
<peter.g.schulze.civ@mail.mil>

DEPUTY ASSISTANT COMMANDANT– ARMY RESERVE
COL Francisco S. Velez III **563-8050**
<francisco.s.velez.mil@mail.mil>

DEPUTY ASSISTANT COMMANDANT–NATIONAL GUARD
LTC Kenneth R. Napier **563-7676**
<kenneth.r.napier.mil@mail.mil>

3D CHEMICAL BRIGADE
COL Jon R. Drushal **596-0016**
<jon.r.drushal.mil@mail.mil>

DIRECTORATE OF TRAINING AND LEADER DEVELOPMENT
COL Casey P. Scott **563-6531**
<casey.p.scott.mil@mail.mil>

PERSONNEL DEVELOPMENT OFFICE
MAJ Ancle R. Evans **563-7374**
<ancle.r.evans.mil@mail.mil>

CHIEF OF DOCTRINE
MAJ Stephen B. Johnson **563-8189**
<stephen.b.johnson.mil@mail.mil>

G-37 PUBLICATIONS
Managing Editor, Diane E. Eidson **563-4137**
<diane.e.eidson.civ@mail.mil>

Editor, Diana K. Dean **563-5004**
<diana.k.dean.civ@mail.mil>

Graphic Designer, Dennis L. Schellingberger **563-5267**
<dennis.l.schellingberger.civ@mail.mil>

Editorial Assistant, Cynthia S. Fuller **563-7651**
<cynthia.s.fuller3.civ@mail.mil>

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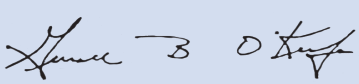


GERALD B. O'KEEFE
Administrative Assistant to the
Secretary of the Army
1505403

Army Chemical Review

The Professional Bulletin of the Chemical Corps

PB 3-15-1, Summer 2015

Army Chemical Review is always looking for good-quality, action photographs (no "grip and grins," please) to use on the outside covers. If you have photographs of Soldiers who are in the proper, current uniform and are participating in training events or operations or photographs of current, branch-related equipment that is being used during training or operations, please send them to us at <usarmy.leonardwood.mscoe.mbx.mdotacr@mail.mil>. Ensure that photographs depict proper safety and security procedures, and do not send copyrighted photographs. All photographs must be high-resolution; most photographs obtained from the Internet, made smaller for e-mailing, or saved from an electronic file such as a Microsoft® PowerPoint or Word document cannot be used for print. In addition, include a caption that describes the photograph and identifies the subject(s) and photographer (if known). Please see our photograph guide at <http://www.wood.army.mil/chmdsd/documents/PhotoGuide.pdf> for more detailed information.

Cover photo: Fort Leonard Wood Public Affairs Office

Chief of Chemical and Commandant, U.S. Army Chemical, Biological, Radiological, and Nuclear School

Brigadier General Maria R. Gervais

Greetings Dragon Soldiers, Civilians, and Families of the Regiment!

As I reflect, it is hard for me to believe that almost a year has passed since I assumed the position of 28th Chief of Chemical. Much has happened during this past year, but nothing more significant than the magnificent daily work of our Dragon Soldiers—guarding America's force; serving as the chemical, biological, radiological, and nuclear (CBRN) counterforce; and protecting the homeland.

And Dragon Soldiers have been making history. The 48th Chemical Brigade was deployed for the first time ever, serving as the mission command element for the closeout of the Ebola virus response mission in Liberia. CBRN battalions have been serving as chemical, biological, radiological, nuclear, and explosives (CBRNE) task forces during decisive-action training at combat training centers. As the maneuver force executes weapons of mass destruction elimination operations in the battlespace, these CBRNE task forces are laying the groundwork for the Army countering weapons of mass destruction concept of operations. Information gleaned from combat training center rotations, coupled with real-world operational planning conducted by the 2d Infantry Division and the 8th Army in Korea, provides input to the Army countering weapons of mass destruction strategy. Finally, history has also been made on the personnel front.

Major General Leslie C. Smith relinquished command of the Maneuver Support Center of Excellence on 8 April 2015 and is now serving as the Deputy Inspector General, Department of the Army. On behalf of all Dragon Soldiers, I would like to personally thank Major General Smith and his wife Vanedra for their steadfast leadership and commitment to the Regiment. We would also like to welcome Brigadier General Kent D. Savre as the new commanding general of the Maneuver Support Center of Excellence.

Brigadier General J. B. Burton relinquished command of the 20th CBRNE Command, Aberdeen Proving Ground, Maryland, on 20 May 2015. I would like to express my sincere appreciation to Brigadier General Burton and thank him for all he has done to operationalize the 20th CBRNE Command. We look forward to working with Brigadier General William E. King and continuing our strong partnership.

Several senior leaders have been selected for centrally selected list positions. We are truly blessed to have them lead our Dragon Soldiers. I would like to personally congratulate those who were selected:

- Colonel Timothy M. Greenhaw, U.S. Army Environmental Command.
- Lieutenant Colonel Alexander C. Lovasz, Headquarters and Headquarters Battalion, 3d Infantry Division.
- Lieutenant Colonel Richard W. Maltbie, Blue Grass Chemical Activity.
- Major Bryon G. Galbraith, 84th Chemical Battalion.
- Major Roberto Salas, 2d Chemical Battalion.
- Major Kevin W. Siebold, 23d Chemical Battalion.
- Command Sergeant Major Christopher Williams, 48th Chemical Brigade.
- Sergeant Major Rebecca Franco, 84th Chemical Battalion.
- Sergeant Major Robert (Shane) Mollohan, 2d Chemical Battalion.
- Sergeant Major Ronald L. Wylie, 23d Chemical Battalion.

I am excited about celebrating the 97th anniversary of the founding of our branch and conducting a CBRN senior executive leader symposium to focus on "How the Chemical Corps Regiment Supports the Fight—Whether Abroad or at Home." Given that this year marks the 100th anniversary of the first use of chlorine gas during the Second Battle of Ypres, Belgium, I can't think of a better time to reflect on our heritage and our legacy. My vision for celebrating our 97th anniversary involves returning to a setting similar to that of a worldwide CBRN event, in which we celebrate our birthday, welcome vendors and experts from across the CBRN community of interest, and reflect on the past while shaping our future.

One of the topics that I remain focused on and concerned with is the CBRN readiness of our Army. The Army has not focused on CBRN training or readiness for the last 14 years. And observations from combat training centers indicate that CBRN training, readiness, and understanding have atrophied tremendously. Units lack basic CBRN skills such as the maintenance and wear of protective masks and Joint Service, Lightweight, Integrated Suit Technology items; and they do not integrate basic CBRN defense tasks and skills into overall unit operations. I see a tremendous opportunity for us, as CBRN professionals, to help reset the Army in terms of CBRN training and readiness. I ask that you accept the challenge and help the Army return to the basics of CBRN defense.

We are on a glide path with the implementation of the CBRN Force Design Update, which will allow CBRN operations to be conducted "left of boom" to mitigate the impacts of weapons of mass destruction use and better enable the protection of the force. In October 2015, our battalions will be converted to a standardized battalion structure with increased maintenance and distribution capabilities. Regular Army maneuver support companies will be converted to hazard response companies in April 2016, and Reserve Component maneuver support companies will be converted to the new design in October 2016. These multifunctional companies will be capable of conducting mounted and dismounted hazmat reconnaissance, characterization, and assessment and performing personnel and equipment decontamination operations.

On 1 June 2015, the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS) will transition from the 10-week Warrant Officer Basic Course taught by the U.S. Marine Corps to its premier 16-week warrant officer course. This course will provide in-depth instruction on all CBRN equipment, including training on advanced troubleshooting for the Nuclear, Biological, and Chemical Reconnaissance Vehicle; sensor suites; and CBRN detection and analytical equipment. Based on the great progress that we have made in warrant officer professional military education, I am confident that CBRN warrant officers will add value to our Regiment by serving as technical experts who will manage and maintain increasingly complex battlefield systems.

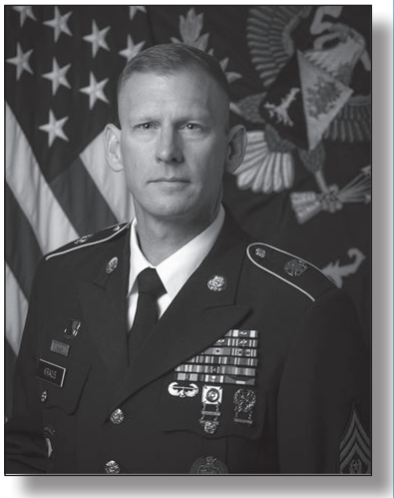
Army Chemical Review provides a forum for professional development and the exchange of ideas. However, it also serves as a window into a past that can provide an understanding of the present day and as a means to help determine how our Regiment and our Army might develop into the future. Throughout the past few months, I have been reviewing previous issues of *Army Chemical Review*, looking for "golden nugget" historical articles that are still valuable today. And I have found that we have a healthy inventory of articles that are worth reading for professional development and for a better understanding of the application of CBRN capabilities, including articles that describe how to provide CBRN defense expertise and capability at the National Training Center, explain the application of smoke/obscurants, and define Army leadership. Reading these and other historical articles also builds a personal understanding about how we as individuals are the sum of a vast range of past experiences and active players who are in the process of change. I have directed my staff to make available to you a number of articles that continue to have universal or specific applications to what we are doing today. Take the time to read these articles and think about how you can apply the information contained in them. These articles are located at <https://www.us.army.mil/suite/files/44553160>.

I am honored to serve as your 28th Chief of Chemical, and I look forward to working with you as we transform our Regiment. Regimental Command Sergeant Major Kenneth J. Kraus Jr., Regimental Chief Warrant Officer Two Matthew D. Chrisman, and I look forward to visiting our CBRN teams and Soldiers. We anticipate seeing the great things you are doing and partnering with you to improve our Regiment.

Elementis regamus proelium!

Regimental Command Sergeant Major

Chemical, biological, radiological, and nuclear (CBRN) warriors: It has been an amazing first few months since I assumed the position of Regimental Command Sergeant Major of the U.S. Army Chemical Corps. During that time, I've met with CBRN units, company and battalion CBRN NCOs, and great leaders and Soldiers from the special-operations community. Our discussions have been extremely valuable; we've shared ideas across the full spectrum of the CBRN enterprise and clarified our mission, vision, and core competencies.



Command Sergeant Major Kenneth J. Kraus Jr.

Army Attributes

In the course of professional development, we must continue to strive for excellent individual performances that directly correlate to organizational success. While measurements of excellence may be complex, the attributes that the Army demands of its leaders must be codified in our everyday efforts. These attributes—character, presence, and intellect—will soon be accompanied by a direct unit of measure on a new version of Department of the Army (DA) Form 2166-8, *NCO Evaluation Report*. Therefore, it is imperative that we know how these attributes are defined and, more importantly, how they are identified and measured with regard to ourselves and our rated NCOs. The fundamentals of these attributes must be studied, understood, and shared with our Soldiers at every level.

Character

Character refers to the moral and ethical qualities of an individual. It is important to remember that leaders are constantly being observed by their leaders, peers, and subordinates everywhere they go—on and off duty. It's like living in a fish bowl and being viewed from every angle. Most Soldiers do the right things and serve as great stewards of our profession. However, even negative perceptions of conduct can ruin reputations. As Thomas Paine once noted, "Character is much easier kept than recovered."[1]

Presence

Presence involves more than just being visible at formations or in places of duty. It involves the ability to inspire Soldiers to do their best. Our craft demands exposure to hostile conditions, which could include an armed enemy or a contaminated environment. Soldiers will follow our lead and will respond to our motivational efforts.

Intellect

Intellect is fairly easy to define, but difficult to measure. According to Army Doctrine Reference Publication (ADRP) 6-22, *Army Leadership*, intelligence draws from conceptual abilities, which ". . . enable effective problem solving and sound judgment."[2] In an address to Congress on the posture of the Army, the Honorable John M. McHugh, Secretary of the Army, and General Raymond T. Odierno, Chief of Staff of the Army, indicated that "Army leaders must be innovative; possess a willingness to accept prudent risk in unfamiliar, highly complex, and dangerous environments; and display an ability to adjust based on continuous assessment."[3]

Professional Development Seminar

General David G. Perkins, commander of the U.S. Army Training and Doctrine Command (TRADOC), recently visited Fort Leonard Wood, Missouri, where he presented a professional development seminar. He discussed our profession and the implementation of TRADOC Pamphlet (Pam) 525-3-1, *The U.S. Army Operating Concept: Win in a Complex World, 2020–2040*, which describes how the Army will prevent conflict; shape the environment; and win wars with joint, multinational, and multiagency partners. We cannot predict when or where we will be deployed to respond to the Nation's call, but the principles contained in TRADOC Pam 525-3-1 will guide us to best prepare for the unknown future. I highly recommend that all regimental leaders take time to read the publication. During the professional development seminar, General Perkins also shared a comment from a foreign military leader, who described our Profession of Arms as the Army's "special sauce." We make up the best army in the world!

Call to Action

The nature of the CBRN business is complex and complicated; but with the proper inculcation of the Profession of Arms, we will win in any environment—anywhere and anytime. Our Regiment is one of the most flexible and adaptive forces in

(Continued on page 6)

Regimental Chief Warrant Officer

Greetings Chemical, Biological, Radiological, and Nuclear (CBRN) Soldiers!

Chief Warrant Officer Two
Matthew Chrisman

In the defense of this country, the U.S. Army Chemical Corps stands apart because we possess "Dragon Soldiers, the Nation's CBRN Counterforce." This description—the theme of this year's regimental birthday celebration—clearly defines who we are and what we do. We have been battle-tested; and in handling threats to America, we will prove that we are battle-hardened.

In my last article, I described how history has revealed the benefits of people working together; this June, those benefits will materialize into something truly historic. Just as the very first Chemical, Biological, Radiological, and Nuclear (CBRN) Warrant Officer Basic Course taught by the U.S. Marine Corps in 2011 was a product of epic collaboration, so too is the very first Army-owned and Army-taught CBRN Warrant Officer Basic Course. The new CBRN Warrant Officer Basic Course has undergone many changes. For example, 6 weeks have been added to what was already a 10-week program and 80 percent of the lessons have been designated to be taught by outside agencies. The U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS) has made every effort to ensure that our Dragon warrant officers are more focused and better-prepared technical experts. Many military and civilian professionals have been involved in the creation of this new course, and the five essential characteristics of the Army Profession have played a part in the process:

- **Military expertise.** Regardless of branch, Army warrant officers embody the true meaning of military expertise. This expertise could be what led them to become warrant officers in the first place. At USACBRNS, officers, warrant officers, noncommissioned officers, and civilians notably contribute their individual expertise to the military.
- **Honorable service.** On a daily basis, Army warrant officers execute duties that reflect honor on those who have come before us. But regardless of the capacity in which we serve, an understanding of who we serve—the people of this Nation—is most important. Every day, I witness honorable service from those who make up this great Regiment.
- **Trust.** Warrant officers understand that trust is bestowed upon them by the Department of the Army, but only after proving themselves through an extensive and rigorous selection and training process. Deeper levels of trust are further established at the unit and Soldier levels. And just as CBRN warrant officers must earn trust, they must lend trust. They can trust that the Chemical Corps will tirelessly work to ensure that they remain the expert CBRN technicians for the Army.
- **Esprit de corps.** Something happens to a warrant officer when he or she runs into another warrant officer. An instant connection is made—a connection that is forged by the common knowledge that both are trusted to be focused on the specific missions of their branches. As a result, the two warrant officers interact with one another in an attempt to find ways to help their individual units become successful. Now, imagine the benefits that all units reap when hundreds of warrant officers connect and network with one another. Then, consider the events that build esprit de corps—events such as military birthday celebrations, promotion ceremonies, changes of command, and organizational days. The opportunities for interaction and collaboration are virtually endless. When we work together, the benefits never cease.
- **Stewardship of the profession.** All Army warrant officers are granted the opportunity to serve an additional 30 years after their appointments as warrant officers. This is their chance to express their gratitude for the opportunity they received, to demonstrate that they are ultimate professionals, and to convey their full understanding of the adage "to whom much is given, much is expected." Likewise, many USACBRNS civilians are retired Soldiers who are determined to continue their service. Their relentless efforts give me purpose and drive my commitment.

These five essential characteristics of the Army Profession are embedded into each and every Soldier. Along with the Army Values, the Warrior Ethos, and the Code of Conduct, these characteristics form the cornerstone of a Soldier. These principles make a Soldier someone who the people of this Nation can depend on, get behind, look up to, and hope to emulate.

As we celebrate the 97th birthday of the Chemical Corps on 28 June 2015, I ask that you pause and reflect on what has transpired to get us where we are now. Think about those who served this great Regiment before us and those who made the ultimate sacrifice. Look to the future and the possibilities that it holds, and continue to serve with honor.

As a CBRN warrant officer, I am honored to serve all Dragon Soldiers. Our missions are my first priority. Defeat is never an option—and neither is quitting. And I will let no one fall behind. May our Warrior Ethos speak as loudly to you as it does to me.

Elementis regamus proelium!

References:

Army Doctrine Reference Publication (ADRP) 1, *The Army Profession*, 14 June 2013.

Matthew Chrisman, "Regimental Chief Warrant Officer," *Army Chemical Review*, Winter 2014, pp. 4 and 5.

("Regimental Command Sergeant Major," continued from page 4)

the Army, and we must continue to challenge ourselves in all aspects of training. Our forces must deploy with speed and wisdom because we will have ***no notice*** for deployment, we must have ***no fear*** in responding, and we will get ***no second chances*** to get it right.

Endnotes:

[1]Thomas Paine, *The American Crisis: Philadelphia*, 19 April 1783.

[2]ADRP 6-22, *Army Leadership*, 1 August 2012, p. 1-5.

[3]John M. McHugh and Raymond T. Odierno, "Prepared Statement," *Department of Defense Appropriations for Fiscal Year 2014*, 22 May 2013.

References:

DA Form 2166-8, *NCO Evaluation Report*, October 2011.

TRADOC Pam 525-3-1, *The U.S. Army Operating Concept: Win in a Complex World*, 2020–2040, 31 October 2014.

Smoke 'Em If You Got 'Em

By Captain David A. Dellerman

Staging the Battlefield

More than 200 Soldiers from Fort Leonard Wood, Missouri, and Fort Riley, Kansas, gather at Training Area (TA) 401 at Fort Leonard Wood, ready to engage in a combined arms breaching rehearsal staged in a multibranch operational environment. It is a sunny day with no cloud cover. The temperature hovers around 50ºF, and the winds are blowing from the south at a steady rate of 20 miles per hour. The TA conditions are set; and OH-58 Kiowa helicopters are in the sky, Abrams tanks and Bradley fighting vehicles from Fort Riley are in place, engineers have readied their breaching assets, military police and their working dogs are tracing the perimeters, and the U.S. Army Chemical Corps and its M56 Coyote smoke generators are in motion.

TA 401 is alive with excitement; and leaders, Soldiers, and observers are enthusiastically awaiting an experience that they will not soon forget! Loud, high-powered jets scream into action from behind three M56 Coyotes! In eager anticipation of what is to come, Soldiers turn and search for something that few of them have seen and even fewer have been involved with—smoke. From the corners of their eyes, they begin to see a rolling, white cloud of smoke. They begin to hear voices murmuring, "Look over there!" and "It must be 'go' time!"

The smoke commander and team leader demonstrate the capabilities of obscuration on the battlefield. The entire training area and its contents become engulfed in a sensory-immersing phenomenon that momentarily confuses some of the more inexperienced Soldiers. However, those Soldiers quickly gather themselves and reassure each other that this is all part of the obscuration plan. The members of the multibranch operation seamlessly do their part to successfully breach the obstacle. The limited visibility and the smell of the smoke continue to dominate the training area until the trigger point is reached just on the other side of the breach. And as quickly as it began, the fast-moving winds carry the smoke away. Soon, it's as if it had never been there. The Soldiers congratulate one another and celebrate on the field.

Getting There

The 4th Maneuver Enhancement Brigade, Fort Leonard Wood, began planning months before the combined arms breaching rehearsal. The primary intent was to provide freedom of maneuver to the maneuver force during the breach of a complex obstacle. Secondary intents included educating officers and noncommissioned officers (NCOs) about combined arms operations and helping to certify the 515th Sapper Company before its National Training Center rotation. The 4th Maneuver Enhancement Brigade incorporated the Chemical, Engineer, and Military Police Branches in the planning process and requested that the Chemical Corps provide obscuration haze.[1]

The commander of the 3d Chemical Brigade, Fort Leonard Wood, agreed to the 4th Maneuver Enhancement Brigade request and viewed it as a great opportunity for the Chemical Corps to demonstrate its battlefield obscuration capabilities to the maneuver commander and others who would be observing the combined arms breaching rehearsal. With a single call, he set his vision into motion, culminating in a monumental moment that demonstrated the capabilities of a smoke unit using obscuration to prevent/reduce casualities to a maneuver force by decreasing operational vulnerabilities to enemy forces. The commander of the 84th Chemical Battalion, 3d Chemical Brigade, was tasked to provide the best smoke team available for the mission. However, this generated a few additional challenges. For example, since there are no smoke units on Fort Leonard Wood, it was necessary to assemble and train a smoke unit—and this needed to be done in less than 20 working days. A continuously prevailing question posed by different leaders in various forms was, "Can you provide obscuration for this mission?" The quick and eager answer was always, "Yes! No problem!"

The Chemical Training Department, 84th Chemical Battalion, motor pool houses three M56 Coyotes that were ready to go; and a group of highly capable chemical, biological, radiological, and nuclear (CBRN) Soldiers was ready to take the vehicles out and brush the dust off of them. Chemical Training Department officers and NCOs immediately jumped into action and started planning, training, and preparing the vehicles to support the combined arms breaching rehearsal. Many of these personnel had never observed the use of obscurants generated from large-platform vehicles to support a breaching operation. And it has been nearly a decade since a CBRN officer last had an opportunity to participate in the planning of a large-scale, complex, combined arms breaching rehearsal and to serve as the smoke commander for the obstacle breach, incorporating obscuration and demonstrating its value to other branches.

An Abrams tank maneuvers through obscuration.

Conducting Reconnaissance and Analysis

A reconnaissance of the terrain and the local weather forecast at TA 401 before the combined arms breaching rehearsal indicated that stationary haze would not be possible. The terrain, which is composed of multiple rolling hills with a lot of mounds and valleys, splits the wind, which was found to be multidirectional during the reconnaissance; and the weather was unfavorable. With changing winds, the team needed to be mobile to cover as much area as possible. Two of the three vehicles available to support the combined arms breaching rehearsal would provide primary smoke into the wind, and the third would be placed on standby in an alternate location—to be used when the winds changed direction. Smoke control points would be used to continually monitor wind changes, and vehicles would be called to shift as necessary.

Succeeding With the Combined Arms Breaching Rehearsal

The leveraging of stakeholder capabilities across the Army through a combined arms breaching operation such as that demonstrated at TA 401 allows for the balanced technical and tactical execution of a mission while minimizing operational vulnerabilities. The incorporation of obscuration in the breaching exercise provided the maneuver force with protection from an enemy attack by limiting the reconnaissance and surveillance capabilities of the enemy. In addition, obscurants covered enemy terrain, instilling a sense of uncertainty, confusion, and isolation in the enemy. This type of situation, which makes use of simultaneous offense, supports unified land operations by exploiting the initiative to gain and maintain an advantage during sustained land operations.

The combined arms breaching rehearsal served as a CBRN capabilities refresher for CBRN officers and NCOs. However, in summing up the operations, the commander of the 84th Chemical Battalion stated, "All units involved walked away with a better understanding of combined arms operations. My battalion was able to bring obscuration capabilities to the operation that many maneuver commanders had not seen before or had forgotten the value of."

Looking Toward the Future

Questions about the relevance of smoke and comments about how it can be replaced by munitions often arise. But those who don't see a future in obscuration need only take a look at current research to become aware of the revitalization of obscuration on small platforms such as drones; manpacks; and unmanned, radio-controlled vehicles. Just as the Edgewood Chemical Biological Center Improved Visual Obscuration Program aims to improve the state of the art in obscuration technology for the warfighter by advancing equipment such as the Light Vehicle Obscuration Smoke System for military police, the Chemical Corps should look toward a future without traditional obscuration/smoke methods and outdated equipment. Research and development efforts are underway to build better capabilities.

Endnote:

[1]Obscuration haze is obscuration placed over friendly areas to restrict adversary observation with fire, but not dense enough to disrupt friendly operations within the screen. An obscuration haze is a concentration of visual obscuration that would allow the identification of a small, tactical vehicle from 50 to 150 meters away from the observer. (Army Techniques Publication 3-11.50, *Battlefield Obscuration*, 15 May 2014.)

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"ECBC Engineers Lead Army in Improving Obscuration Capabilities for the Warfighter," Edgewood Chemical Biological Center, 28 April 2014, <http://www.ecbc.army.mil/pr/download/2014/PR_28APRIL14_obscuration.pdf>, accessed on 1 April 2015.

"ECBC Fields Light Vehicle Obscuration Smoke System in Germany," *Aberdeen Patch*, 28 May 2013, <http://patch.com/maryland/aberdeen/bp--ecbc-fields-light-vehicle-obscuration-smoke-syste9bc91ceae3>, accessed on 1 April 2015.

Captain Dellerman is a CBRN officer assigned as the chief of the Chemical Training Department, 84th Chemical Battalion. He is currently working toward a Ph.D. in clinical psychology.

CBRNE Task Forces

By Brigadier General J. B. Burton, Colonel F. John Burpo, and Lieutenant Colonel Elmore F. Smoak (Retired)

Since the advent of modern warfare, commanders have applied a combined arms strategy to overmatch adversary capabilities and to generate decisive advantages at key points on the battlefield. Formed from mounted and dismounted maneuver units—and with artillery and aviation support—the overwhelming, integrated combined arms entities complement one another. Similarly, today's chemical, biological, radiological, nuclear, and explosives (CBRNE) units must be capable of being employed as integrated formations to capitalize on their overlapping and synergistic strengths and to provide supported commanders with the capacity to effectively and decisively operate in an environment that is complicated by CBRNE hazards. This article describes the evolution of the 20th CBRNE Command from a functional force provider of chemical, biological, radiological, and nuclear (CBRN) and explosive ordnance disposal (EOD) capabilities to one that scales, tailors, and employs multifunctional CBRNE task forces to meet the full range of CBRNE threats and hazards and the employment of these CBRNE task forces at combat training centers (CTCs). For the purposes of this article, the term *CBRNE* includes the full range of low- to high-yield explosive threats, encompassing the subset of critical tasks that EOD Soldiers perform—from unexploded ordnance to improvised explosive device (IED) defeat tasks.

History

In 2003, during Operation Iraqi Freedom, the Department of Defense (DOD) was directed to find, exploit, collect, and eliminate Iraqi weapons of mass destruction (WMD). However, DOD had no standing CBRNE capability with which to accomplish this strategically important mission. The 75th Field Artillery Brigade was assigned the mission, and the unit formed the core of the 75th Exploitation Task Force. But because the 75th Exploitation Task Force was merely an ad hoc solution to a strategic problem, the task force immediately faced numerous capability challenges resulting from a lack of doctrine, training, communications, organization, and equipment. Recognizing these challenges, Headquarters, Department of the Army (DA), directed the establishment of a single headquarters for worldwide CBRNE response in support of homeland defense and regional combatant commanders. Consequently, the 20th CBRNE Command (originally named the Guardian Brigade, then the 20th Support Command) was activated on 16 October 2004 to provide a synergistic response to the dynamic, rapidly evolving, asymmetric threats that we now face.

Even before the 20th CBRNE Command reached full operational capability, the 2006 *Quadrennial Defense Review Report* further expanded its mission to serve as the headquarters for a rapidly deployable joint task force for WMD elimination. And today, the 20th CBRNE Command is a highly technical, special-purpose, expeditionary formation of more than 5,000 Soldiers and 225 civilians who are posted on 19 different installations across 16 states within the continental United States (CONUS). The 20th CBRNE Command includes 85 percent of the Regular Army CBRN and EOD units and is the only DA command with the specialized CBRNE capabilities and expertise necessary to effectively operate across the full range of CBRNE threats and hazards. These capabilities reside within the 48th Chemical Brigade; the 52d Ordnance Group (EOD); the 71st Ordnance Group (EOD); and the Chemical, Biological, Radiological, Nuclear, and Explosives Analytical and Remediation Activity (CARA).

To better reflect the complete set of current and anticipated command missions, orders, and taskings, the U.S. Army Forces Command (FORSCOM), in July 2014, approved the following mission statement**:** "The 20th CBRNE Command deploys to support unified land operations and performs mission command for Army and/or joint CBRN and EOD forces to achieve national CWMD [countering weapons of mass destruction], homeland defense, and defense support of civil authorities (DSCA) objectives while providing globally responsive CBRN and EOD forces to combatant commands."[1]

Within the homeland, the 20th CBRNE Command routinely engages and operates with—and in support of—joint, interagency, and other CBRNE organizations and entities. Specific missions involve EOD emergency response; very important person protection support activity; the defense CBRN response force; DCSA; defense support of civilian

law enforcement agencies (ranging from bomb disposal in civilian communities to the packaging and movement of recovered chemical warfare materiel); the ground collection task force for the national technical nuclear forensics mission, led by the Federal Bureau of Investigation; and other special missions with recall windows ranging from 4 hours to 2 weeks. In addition, 20th CBRNE Command forces are concurrently deployed in support of multiple geographic and functional commands and CARA is concurrently engaged with ongoing recovered chemical warfare material remediation missions at formerly used defense sites and remains ready to support analytical operations anytime, anywhere.

CBRNE Task Force

20th CBRNE Command formations had historically been employed as individual units based on the capabilities required at the company level or higher; however, commanders expressed interest in having a single CBRNE headquarters responsible for the integration and employment of these low-density, highly technical capabilities. Therefore, during 2013 operational planning activities for contingency operations, leaders of supported Army divisions and corps requested an integrating headquarters for all attached CBRN and EOD formations. As a result, the 20th CBRNE Command began organizing, training, and employing tailored CBRNE task forces with different CBRN and EOD capabilities to meet the full range of CBRNE hazards anticipated in the operational environment.

Strategic Guidance

An impetus for forming CBRNE task forces was also contained in multiple strategic documents. The *Army Strategic Planning Guidance–2013* states that ". . . the Army will implement a regionally aligned force concept that leverages the scalable capabilities of modular structures to provide mission-tailored forces to combatant commanders" and ". . . regional alignment will provide the combatant commander up to joint task force-capable headquarters with scalable, tailorable capabilities to shape the environment and provide contingency forces."[2] And the *Quadrennial Defense Review–2014* reemphasizes the pursuit of "employing regionally-focused forces to provide additional tailored packages."[3] In addition, the *Army Strategic Planning Guidance–2014* states that, "Agile, adaptive, and integrated conventional forces, special operations forces (SOF), specialized [EOD] and CBRN forces, and missile defense provide a unique mix of scalable and tailorable capabilities across the total Army."[4] Furthermore, *Force 2025 and Beyond: Unified Land Operations—Win in a Complex World* indicates that the Army provides the preponderance of forces and capabilities necessary to counter WMD threats and CBRNE hazards in the land domain.[5]

A complex and unpredictable environment is a common strategic guidance theme that calls for an agile, adaptive, tailorable, and expeditionary Army. The 20th CBRNE Command, in partnership with supported maneuver forces, has thoroughly analyzed these challenges and will meet the demands of the rapidly changing strategic environment by task-organizing and regionally aligning subordinate formations to ensure that forces are best organized, best trained, and focused on specific global threats.

Organization

The 20th CBRNE Command is proposing to reorganize and regionally align the command into three multifunctional CBRNE brigade task forces, with each task force enabled by a chemical, biological, radiological, nuclear, and explosives coordination element (CCE) that is enhanced with robust CBRNE planning and technical reachback capabilities (see Figure 1). Whether organized for training or contingency operations or as an enduring organization, this multifunctional task force structure is designed to—

- Deliver more capable and flexible, regionally focused CBRNE forces.
- Mitigate the challenges of historical ad hoc solutions to similar and anticipated future mission sets.
- Overcome current unity-of-command and unity-of-effort challenges resulting from the geographically distributed basing construct and complex mission profiles of the command.

Regional Alignment

To better focus training and preparation for regional contingencies while building the confidence of home station Army CBRN and EOD formation partners, the 20th CBRNE Command is proposing that each CBRNE brigade task force be regionally aligned with specific Army service component commands, consistent with the FORSCOM mission alignment orders for the CONUS-based corps:

- Task Force 71 (CBRNE), positioned in the western United States, is aligned to support I Corps, with a focus on the U.S. Pacific Command area of responsibility.
- Task Force 48 (CBRNE), positioned in the central United States, is aligned to support III Corps and is focused on the U.S. Central Command, U.S Africa Command, and U.S. European Command areas of responsibility.
- Task Force 52 (CBRNE), positioned in the eastern United States, is aligned with XVIII Airborne Corps in support of its global response force mission.

Formation and Employment

For training, regionally aligned, multifunctional CBRNE task forces ensure the development of habitual team familiarity with supported forces and an understanding of likely deployed areas of operation. These task forces serve as a starting point for scaling and tailoring organizations across a range of contingency mission sets (Figures 1 and 2, pages 11 and 12) and may be further enabled with CCEs, nuclear disablement teams (NDTs), and mobile expeditionary laboratories.

CTC Rotations

During fiscal years 2014 and 2015, the 20th CBRNE Command has planned and executed nine CBRNE battalion task force rotations at the National Training Center, Fort Irwin, California, and the Joint Readiness Training Center,

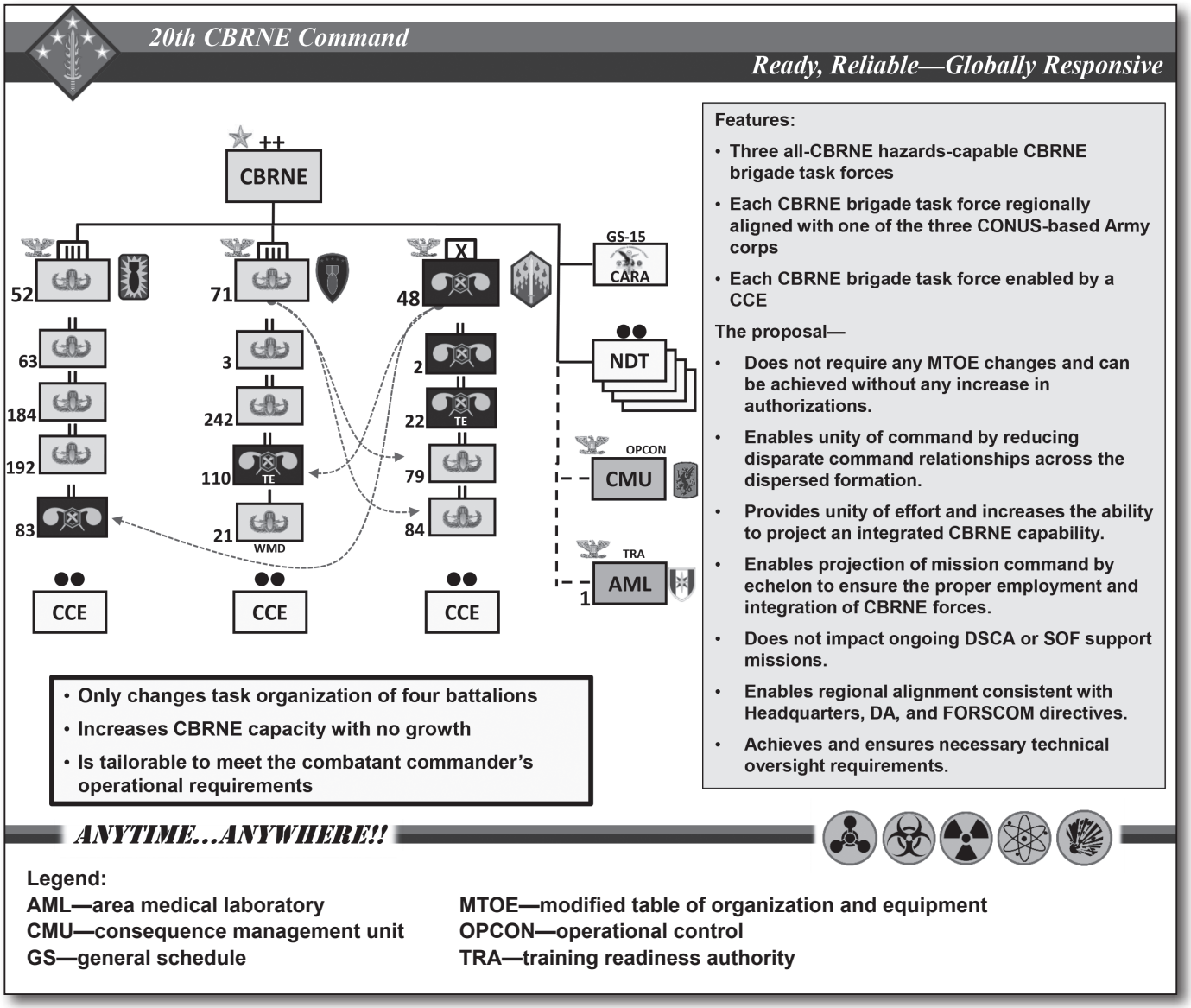

Figure 1. Proposed CBRNE brigade task force organization

Fort Polk, Louisiana. Four additional rotations are planned for fiscal year 2016.

One of the more complex CTC rotations was National Training Center 14-08, which was part of a larger 20th CBRNE Command exercise, Atropian Phoenix 14, that demonstrated the CBRNE task force concept and its role within the greater CBRNE enterprise. This distributed command post and field training exercise integrated the 20th CBRNE Command operational command post at Edgewood, Maryland, with the tactical command post of the Headquarters, 48th Chemical Brigade, Fort Hood, Texas; the Headquarters, 52d Ordnance Group (EOD), Fort Campbell, Kentucky; and CBRNE Task Force 110, Joint Base Lewis-McChord, Washington, at the National Training Center.

At the National Training Center, CBRNE Task Force 110—composed of chemical reconnaissance and decontamination units; EOD units; chemical, biological, radiological, nuclear, and explosives response teams (CRTs); an NDT; and a heavy, mobile, expeditionary laboratory (HMEL) (Figure 3, page 13)—supported the 2d Stryker Brigade Combat Team from Joint Base Lewis-McChord. The task force conducted CBRNE operations throughout the area of responsibility to protect U.S. forces from enemy CBRNE employment, enable freedom of movement and maneuver, and support CBRNE counterforce operations by securing and exploiting hazardous sites to prevent enemy production, use, or proliferation of WMD or CBRNE material. The task force formation allowed the integration of capabilities under a single commander; otherwise, the assignment of multiple, potentially separate command and support relationships would have been required throughout the supported brigade combat team.

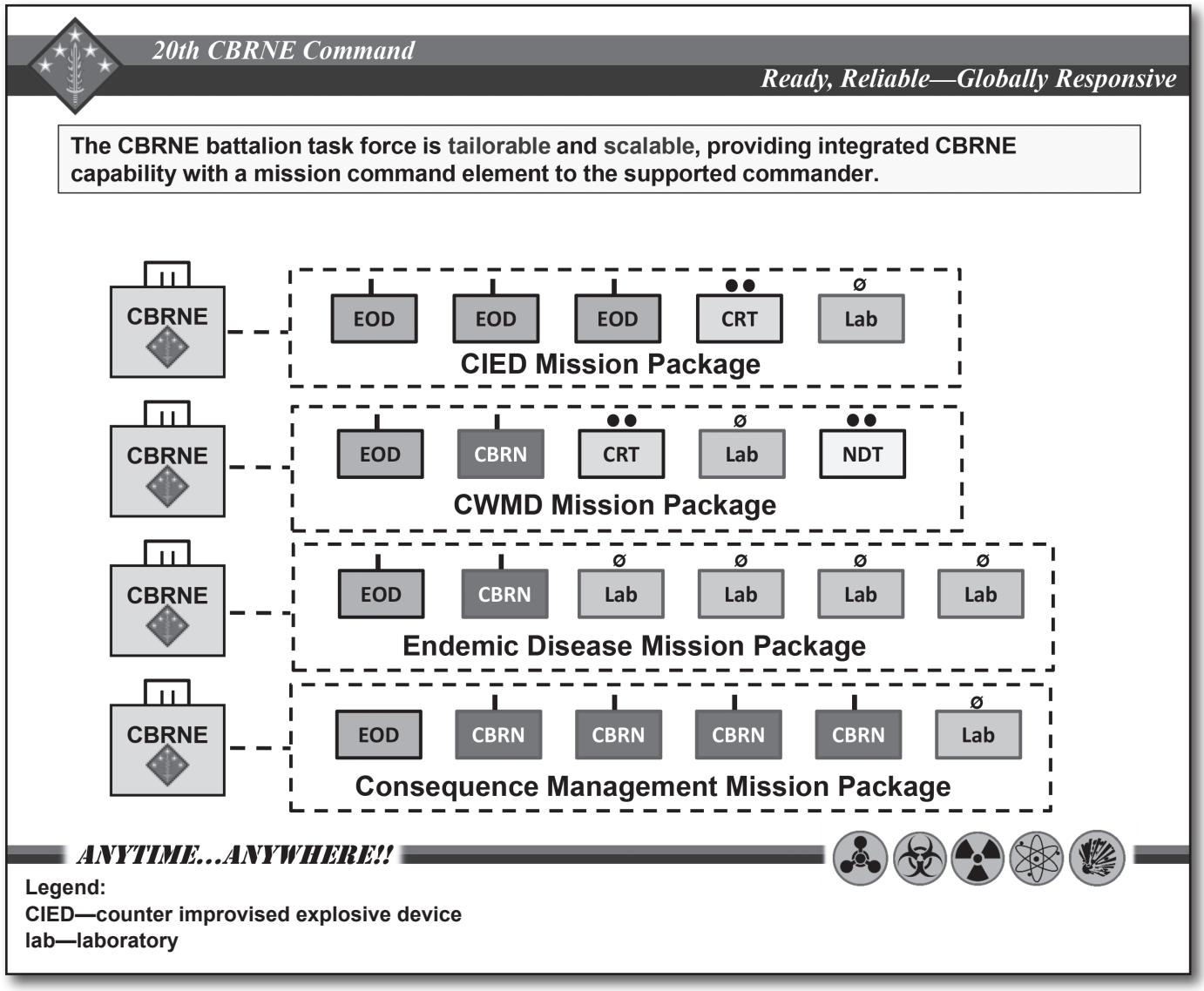

Figure 2. Potential integrated CBRNE mission packages to meet identified threats

Following Atropian Phoenix 14, the commander of CBRNE Task Force 110 summarized the impact by stating, "The exercise forced the CBRNE task force to effectively integrate with maneuver and other supporting units to conduct a coherent counter WMD and counter IED campaign. We see this as the wave of the future for our formations." The commander of the 48th Chemical Brigade added, "Atropian Phoenix improved our ability to operate as a CBRNE task force by allowing us to train with a set of enablers—communications capabilities, technical capabilities—that we don't have organically in a normal chemical brigade command post." He also said that the inclusion of a CCE greatly improved his ability to command integrated CBRNE operations.

Gaps and the Way Forward

Through experiences with CTC rotations, the 20th CBRNE Command will continue to shape its supported maneuver partners' understanding of its capabilities and better inform the CBRNE enterprise about the best way to support maneuver commanders and to resource expeditionary activities. The CTC rotations have illuminated gaps—particularly in the areas of communication, sustainment, mobility, and protection—while establishing the foundation for tactics, techniques, and procedures for executing CBRNE operations, which must be standardized and trained throughout the Army. Some of the specific gaps involve organizational logistics; communications; mission command; technical intelligence and fusion capabilities; and the ability of subordinate forces to provide readily available, multifunctional, and modular CBRNE capabilities. The 20th CBRNE Command, in partnership with the U.S. Army Training and Doctrine Command, continues to formally capture lessons learned across the warfighting functions. The Maneuver Support Center of Excellence is currently drafting Army Techniques Publication 3-37.11, *CBRNE Task Force Operations*, to help address doctrine and training gaps.

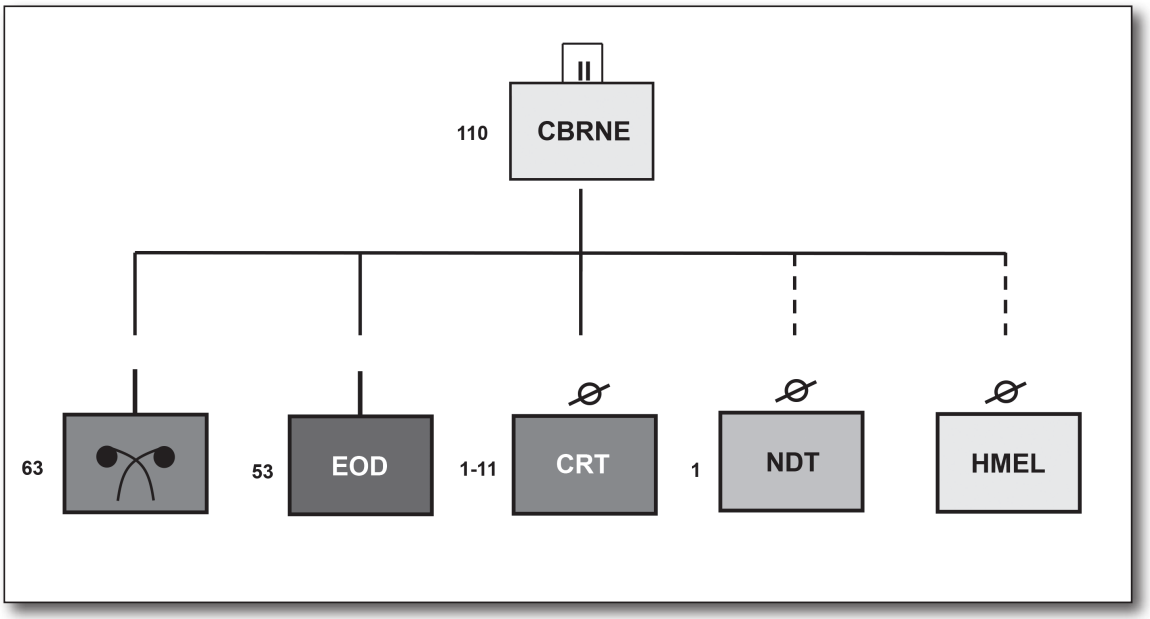

Figure 3. CBRNE Task Force 110

Conclusion

The objective of the 20th CBRNE Command is to provide the Army and the Nation with ready, reliable, and globally responsive CBRNE forces that are capable of leading and executing CBRNE-related operations and activities, anytime and anywhere. Organizing 20th CBRNE Command capabilities into regionally aligned, scaled, and tailored CBRNE task forces is an important step in meeting the Nation's strategic guidance for this one-of-a-kind formation; and it provides our Army and our Nation with an improved solution for delivering an integrated CBRNE capacity to meet expeditionary and campaign requirements.

Endnotes:

[1]"20th CBRNE Command," briefing, National Defense Industrial Association, 27 February 2015, <http://www.ndia.org/Divisions/Divisions/CBRN/Documents/530b%20-%20NDIA%20Briefing%20Feb%202015%20RELEASABLE.pdf>, accessed on 24 March 2015.

[2]*Army Strategic Planning Guidance–2013*, pp. 2 and 5, <http://usarmy.vo.llnwd.net/e2/rv5_downloads/info/references/army_strategic_planning_guidance.pdf>, accessed on 23 April 2015.

[3]*Quadrennial Defense Review–2014*, DOD, 4 March 2014, <http://www.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf>, accessed on 23 April 2015.

[4]*Army Strategic Planning Guidance–2014*, p. 18, <http://www.defenseinnovationmarketplace.mil/resources/ASPG2014.pdf>, accessed on 23 April 2015.

[5]*Force 2025 and Beyond: Unified Land Operations—Win in a Complex World*, U.S. Army Training and Doctrine Command, October 2014, <http://www.arcic.army.mil/app_Documents/TRADOC_AUSA_Force2025AndBeyond-UnifiedLandOperations-WinInAComplexWorld_07OCT2014.pdf >, accessed on 23 April 2015 .

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J. B. Burton is the U.S. Army Transitioning Executive Leader, Washingon, D.C. He is the former commander, 20th CBRNE Command, Aberdeen Proving Ground, Maryland. He holds a master of military art and science degree from the U.S. Army Command and General Staff College, U.S. Army Combined Arms Center, Fort Leavenworth, Kansas, and a master's degree in national security and strategic studies from the U.S. Naval War College, Newport, Rhode Island.

Colonel Burpo is the Deputy Commander for Transformation, 20th CBRNE Command. He also serves as the deputy head of the Department of Chemistry and Life Science, U.S. Military Academy–West Point, New York. He holds a master's degree in chemical engineering from Stanford University, Stanford, California, and a doctor of science degree in bioengineering from the Massachusetts Institute of Technology.

Lieutenant Colonel Smoak (Retired) served as an Army chemical officer for 24 years. Since his retirement, he has coauthored the U.S. Department of Homeland Security Domestic Preparedness Program, facilitated national-level crisis management seminars in five of the former Soviet republics, served as the chief CBRN technical officer in support of the Guardian Program, and supported the 20th CBRNE Command during exercises from Jordan to South Korea.

The 23d CBRNE Battalion: How We Train and Sustain

By Major Denise R. Little and Major Rogelio A. Pineda

The 23d Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Battalion, Camp Stanley, Korea, is the largest—and only forward-deployed—U.S. Army CBRNE battalion capable of weapons of mass destruction (WMD) and hazard reconnaissance, exploitation, and decontamination in the Korean theater of operations. The battalion consists of the—

- Headquarters and Headquarters Detachment.
- 4th Chemical, Biological, Radiological, and Nuclear (CBRN) Company.
- 61st CBRN Company.
- 62d CBRN Company.
- 501st CBRNE Company (Technical Escort).
- 718th Ordnance Company (Explosive Ordnance Disposal).

Each of the CBRN companies consists of one nuclear, biological, and chemical reconnaissance vehicle (NBCRV) platoon and three decontamination platoons—two of which are assigned the additional mission of reconnaissance and surveillance.

The 23d CBRNE Battalion trains for two distinct wartime mission sets:

- Freedom of movement and maneuver.
- WMD elimination operations.

The battalion must execute these two distinct mission sets with a high level of technical competence at the same time that it endures continuous personnel turnover. Our challenge is to meet the need to "Fight Tonight" in two complementary areas—how we train and how we sustain.

How We Train

The 23d CBRNE Battalion, which is assigned to the 1st Armored Brigade Combat Team (1ABCT), 2d Infantry Division (2ID), has an operational control training relationship with 1ABCT maneuver battalions. Therefore, to further enable both mission sets, the 23d CBRNE Battalion formulates as a company team package consisting of one maneuver support CBRN company and one chemical, biological, radiological, nuclear, and explosives response team (CRT). The company team package is task-organized to one of the 1ABCT maneuver battalions and, along with the CBRN company commander, forms a complete package. The CBRN company commander, who is colocated with the maneuver battalion commander, provides the maneuver battalion commander with technical advice on how to best use the full spectrum of CBRNE assets under his or her control.

To maintain the "Fight Tonight" standards of 2ID, the 23d CBRNE Battalion must continuously conduct driver's training courses, combatives training, weapons range exercises, and Tactical Combat Casualty Care courses. Therefore, the battalion training plan must account for the significant turnover of personnel (approximately 50 percent every 6 months) in Korea. To meet this challenge, the battalion developed an aggressive, 6-month training cycle—formalized in a unit training plan—that provides space and predictability for companies to train at individual and collective levels.

The primary focus during the first quarter of the 6-month training cycle was a battalion level NBCRV gunnery and squad situational training exercise that resulted in the certification of NBCRV squads and subteams within each reconnaissance and surveillance platoon, CRT, and decontamination platoon. The first dismounted reconnaissance sets, kits, and outfits (DRSKO) were concurrently fielded to six reconnaissance and surveillance platoons and four CRTs within the 23d CBRNE Battalion. A secondary focus was on driver's training, the Combatives Level I Course, monthly weapons range exercises, and Tactical Combat Casualty Care courses. Other priorities included operationalizing leader development and certification through a comprehensive lieutenant development program; battalion competitions; and focus areas aimed at physical readiness, weapons proficiency, medical tasks, maintenance, and logistics.

The culminating event of the second quarter of the training cycle was a battalion level, combined CBRNE field training exercise that included participation from maneuver battalions and aligned Republic of Korea partners and was executed according to the WMD elimination mission.

A U.S./Republic of Korea combined mission command at a simulated WMD site

Six reconnaissance and surveillance platoons and two CRTs were certified during the CBRNE field training exercise. The secondary focus of the battalion during the second quarter was on collective NBCRV gunnery. Other priorities included the completion of DRSKO fielding, driver's training, the Combatives Level II Course, monthly weapons range exercises, and Tactical Combat Casualty Care courses. In addition, leader development and certification continued.

The 23d CBRNE Battalion discovered that the stated priorities for both quarters of the 6-month training cycle were accompanied by training challenges which were unique to Korea. To address the challenges associated with conducting an internal battalion level NBCRV gunnery, the battalion employed the 1ABCT master gunner to train three reconnaissance and surveillance platoon sergeants and a designated battalion master gunner from the operations and training (S-3) office. But because assignments to the 23d CBRNE Battalion are just 1 year in length, that approach only resulted in a short-term solution. To increase continuity within NBCRV platoons, the 23d CBRNE Battalion began providing funding for an eligible senior noncommissioned officer (NCO) to attend the Stryker Master Trainer Course (held in the United States) if the NCO agreed to a 1-year extension of his or her tour in Korea. The NCO then served as the Stryker master trainer in the S-3 office for the duration of the extension.

The fielding of DRSKO also brought substantial training challenges to light. Occupational Safety and Health Administration safety standards require that all Soldiers operating in self-contained breathing apparatuses be certified at the hazmat operations level. And the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS) requires that advanced individual training and Advanced Leader Course graduates be certified at the hazmat operations and technician levels. However, the 23d CBRNE Battalion receives Soldiers who have not met these requirements or whose certifications could not be located in the Department of Defense (DOD) Fire and Emergency Services Certification Program Lookup System (available at <www.dodffcert.com>). Furthermore, the nearest location where hazmat operations and hazmat technician level certifications can be obtained is the U.S. Air Force Fire Emergency Service at Osan Air Base—about a 2-hour drive from Camp Stanley. The battalion continues to work with USACBRNS and the U.S. Army Human Resources Command to ensure that assigned personnel have obtained the necessary certifications and that the information has been uploaded to their digital profiles.

The battalion discovered that, due to the high personnel turnover rate, maintaining proficiency levels comparable to those observed in the United States was unrealistic. The 23d CBRNE Battalion tackled the challenge of maintaining and increasing the technical proficiency levels of reconnaissance and surveillance platoons and CRTs using a three-pronged approach. First, the battalion chose to protect CRTs from red-cycle taskings throughout the 6-month training cycle.[1] The CRTs were involved in green- and amber-cycle taskings; and during the amber cycles, they were called on, if needed, to assist the red-cycle company. For example, the CRTs covered numerous M9 pistol range taskings during the 6-month training cycle because they had the experience required for such taskings. The second means that the 23d CBRNE Battalion used to increase the proficiency levels of reconnaissance and surveillance platoons and CRTs was through the quarterly funding of stateside mobile training teams. Depending on mobile training team availability, the battalion funds training for Advanced Chemistry and Biology, Advanced Radiation I and II, Hazardous Air Pollutants On Site (HAPSITE)®, Portable Isotopic Neutron Spectroscopy (PINS)®, and Target Recognition. And finally, the 23d CBRNE Battalion continues to identify personnel throughout the formation who are master trainers on other technically demanding equipment. For example, CRT sergeants are technically proficient on higher-level analytics, as are explosive ordnance disposal team leaders on various robots. Through the use of a certification checklist that includes quarterly, semiannual, and annual testing requirements, these identified master trainers now certify rotational personnel in areas such as HAPSITE, PINS, and Throwbots® (miniature reconnaissance robots) as they arrive at their assigned units.

Although the 23d CBRNE Battalion maintained proficiency with its assigned mission-essential task list, it did not do so without facing challenges that were unique to Korea. Whether training for either of the two battalion wartime missions or meeting "Fight Tonight" deployment readiness requirements, adjustments for personnel turnover were continuous. The battalion discovered that the best way to adjust

for the extremely high personnel turnover rates in Korea was by incorporating a 6-month training cycle and identifying master trainers to increase technical and tactical proficiency and continuity.

How We Sustain

To meet "Fight Tonight" sustainment requirements, the 23d CBRNE Battalion collaborated with sustainment units at brigade and theater levels to develop a comprehensive plan for support in armistice and wartime operations. At the battalion level, the primary task was to develop a comprehensive maintenance program, a 72-hour unit basic load, and push packages for resupply operations. The sustainment requirements were shared with higher echelons using venues such as Ulchi Freedom Guardian, 2ID WMD Elimination Microexperiment, Key Resolve, and Warpath exercises.

Maintenance Program

Two NBCRVs from the Brigade Special Troops Battalion, 1ABCT, were task-organized to the 23d CBRNE Battalion, increasing the battalion NBCRV fleet for the purpose of training and readiness oversight. The battalion maintained a 20-vehicle NBCRV fleet above 90 percent by implementing a comprehensive maintenance program, which included the following advancements:

- An extension to the field service representative contract was requested, granted, and funded by the project manager.
- The NBCRV technical manual was condensed into a more manageable, user-friendly version to assist Soldiers in conducting preventive maintenance checks and services.
- Soldiers with Military Occupational Specialty 94F (Computer/Detection Systems Repairer) and Additional Skill Identifiers F1 (Biological Integrated Detection System/ Joint Biological Point Detection System Repairer) and F6 (NBCRV Sensor Suite Maintenance Technician) were diverted to the Korean Peninsula.
- The battalion maintenance officer and a select master NBCRV maintenance NCO attended the Additional Skill Identifier F6 course and an abbreviated Universal Mobile Tester course at Fort Gordon, Georgia.
- 2ID acquired a Universal Mobile Tester for the battalion to conduct services on the Biological Agent Warning System and run diagnostics on the line-replaceable units in the Joint Biological Point Detection System.
- The project manager installed data collectors in two NBCRVs to identify the root causes of maintenance failures with the Chemical Biological Mass Spectrometer.
- Circuit cards were purchased and added to the unit basic load of the NBCRV platoon to replace damaged cards in the Mass Spectrometer Electronics Module and save on Chemical Biological Mass Spectrometer costs.
- Quarterly NBCRV operator and maintenance courses were conducted, with semiannual support from project manager instructors providing training on start-up, operation, troubleshooting, and shutdown procedures for the sensor suites.

With the fielding of DRSKO, there was no requirement for a field service representative for reconnaissance and surveillance platoons; therefore, equipment went straight to the test, measurement, and diagnostic equipment activity for service while consumables were ordered through the usual Army supply system. Furthermore, the equipment was standardized across all assessment teams except CRTs. The battalion extracted the preventive maintenance checks and services from the technical manuals, with equipment identified as requiring weekly and monthly maitenance; consequently, the technical manual was reduced to a 147-page document. Additionally, in the interest of simplicity and a common understanding across the battalion, a standardized bumper format was developed for uploading DRSKO equipment into Standard Army Maintenance System–Enhanced boxes. Due to the unique requirement of the 501st CBRNE Company to maintain its commercial, off-the-shelf equipment, a field service representative contractor was employed to assist with the troubleshooting, service, repair, and evacuation of equipment to the continental United States and the procurement of consumables for commercial, off-the-shelf equipment.

Unit Basic Load

The next sustainment challenge that the 23d CBRNE Battalion tackled was the identification and subsequent funding of the unit basic load required to meet "Fight Tonight" standards. The battalion ordered 72 hours' worth of consumables for its units and enough decontamination solution for three combat arms battalions. In addition, the battalion purchased the new PINS3-CF®, thus reducing the logistic requirement for liquid nitrogen. Throughout receipt of the unit basic load, all companies continued to improve load plans to account for all classes of supplies during numerous battalion, brigade, and division alert exercises. These exercises refined alert procedures in preparation for wartime missions.

Push Packages

To resupply the newly designed company teams for their wartime mission, the battalion developed push packages for NBCRV reconnaissance platoons, reconnaissance and surveillance platoons, decontamination platoons, CRTs, and explosive ordnance disposal teams. The definition of the sustainment requirement provided a shared (user to theater level) understanding of the WMD resupply system. Push packages consisted of a standard set of consumables that could be adjusted to meet any specific mission requirement. In most cases, standard push packages were requested; however, after conducting a large mission at a biological facility, additional handheld assays and RAZOR® EX pouches may be added to the push package for CRTs. Collaborations regarding the contents and cost of push packages were conducted with 1ABCT, 2ID, and the 19th Expeditionary Sustainment Command during the 2015 2ID WMD Elimination Microexperiment, which was facilitated by the Asymmetric Warfare Group.

(Continued on page 20)

The CBRN FDU: Building the Future Force Today

By Major James P. Harwell

In the summer of 2012, Brigadier General Peggy C. Combs, who was then the 27th Chief of Chemical, directed a review of the U.S. Army chemical, biological, radiological, and nuclear (CBRN) force. The review was designed to assess the ability of the U.S. Army Chemical Corps to support evolving missions related to global contingency operations. The assessment revealed a Corps that was out of balance—built for a bygone era and ill-suited to counter contemporary weapons of mass destruction (WMD) threats and CBRN hazards. Consequently, Brigadier General Combs directed a force design update (FDU) in order to posture the force to provide the right mix of capabilities. In October 2014, the Vice Chief of Staff of the Army approved the CBRN FDU; and in fiscal year 2016, the Army will begin transforming the CBRN force to meet future operational requirements. As the Regiment evolves, it is important that the community of practice understand the reasons for the changes and the capabilities of the future force.

"Change is necessary to optimize the force to support contemporary and future requirements. The intent of the FDU is to provide a scalable, tailorable force that is capable of supporting the full spectrum of missions for Army and joint commanders."

A Force Out of Balance: Impetus for Change

Before executing the redesign, the Capabilities Development Integration Directorate; Concepts, Organization, and Doctrine Development Division; U.S. Army Maneuver Support Center of Excellence (MSCoE), conducted an analysis of current force capabilities in relation to the capabilities directed through strategic guidance and combatant command operational plans. The assessment revealed a current force designed almost exclusively for the CBRN passive defense mission, with 73 percent of the current structure organized to conduct decontamination and biological detection operations (see Table 1, page 18).

After assessing the capabilities of the current force, the Capabilities Development Integration Directorate—with input from the operating force—conducted an analysis of joint force requirements. The analysis indicated that combatant commands require a CBRN force that is capable of executing a wide array of missions. While the contemporary force is manned, trained, and equipped to support the CBRN defense mission, a large part of the force is sourced in support of WMD elimination and CBRN consequence management operational plans. To execute these missions, operating force commanders rely heavily on nonstandard solutions to provide dismounted reconnaissance and mass casualty decontamination capabilities. While these solutions provide initial capabilities, they are not completely supported by the generating force, which places the burden for training and sustainment on operational commanders. The analysis revealed that, while the CBRN force has evolved over the past decade, it has failed to meet contemporary requirements. Change is necessary to optimize the force to support contemporary and future requirements. The intent of the FDU is to provide a scalable, tailorable force that is capable of supporting the full spectrum of missions for Army and joint commanders. The FDU is one element of an integrated doctrine, organization, training, materiel, leadership and education, personnel, and facilities–policy (DOTMLPF-P) solution set that enhances the relevance and readiness of the Chemical Regiment on the contemporary battlefield.

The CBRN Battalion: Restoration of Balance

One of the requirements of the FDU is to increase the mission command capability of the CBRN force. The need for this increased capability is based on the global force management demand signal that currently sources battalion headquarters to support WMD elimination and consequence management operations. The complexity of the missions requires increased technical and tactical expertise to

	Decon (L)	Decon (H)	Recon (A)	Recon (L)	BIDS	Obs	CRT
FY15 SRC 03 Capability by Platoon							
SRC 03	32%	18%	14%	6%	23%	3%	4%
FY15 SRC 03 Capability by Component							
Regular Army	53%	0%	23%	0%	0%	0%	24%
Army National Guard	9%	28%	13%	30%	13%	7%	0%
U.S. Army Reserve	26%	16%	11%	6%	41%	0%	0%

Legend:
A—armor
BIDS—Biological Integrated Detection System
CRT—chemical, biological, radiological, nuclear, and explosives response team
decon—decontamination
FY—fiscal year
H—heavy
L—light
obs—obscuration
recon—reconnaissance
SRC—standard requirements code

Table 1. CBRN Force Capability Distribution

adequately advise the maneuver commander concerning the employment of CBRN forces in a dynamic operating environment. This is accomplished primarily by changing the doctrinal echelon that is supported by CBRN formations. Divisions have historically received a CBRN company (maneuver support) in support of operations in which the potential for WMD threats or CBRN hazards exists. The CBRN company is capable of providing mounted reconnaissance support and supported operational and thorough decontamination across a division area of operations, but lacks a robust staff to support plans and battle management. While these functions were previously supported by division CBRN staff, headquarters staff reductions have increased the strain on the staff, impacting its ability to conduct sustained operations. To mitigate the problem, the FDU establishes a doctrinal relationship between CBRN battalion headquarters (Figure 1) and Army divisions. Based on the future force design, a division that is deployed with two to six supporting CBRN companies to an operational environment containing a CBRN threat will also deploy with a supporting battalion. This change will result in the necessary technical expertise and command experience to advise the division commander and staff on the employment of CBRN formations across the range of military operations.

In addition to increasing the mission command capability of the CBRN force, the CBRN FDU also enhances sustainment capabilities to support current missions and future materiel systems. The FDU provides for the addition of a distribution section (with two palletized load systems) to the battalion logistics officer (S-4) to support the movement of dismounted reconnaissance sets, kits, and outfits and to provide an enhanced bulk resupply capability. This addition is intended to mitigate capability gaps that were identified by defense CBRN response force units which were previously issued commercial, off-the-shelf Dismounted Reconnaissance Systems in response to a 2010 U.S. Army North operational needs statement.

The Hazard Response Company: Focal Point of the Future Force

Throughout the last decade, CBRN company missions have gravitated toward joint force commander requirements while the institutional structure and capabilities have remained relatively unchanged since the Cold War. Since 2004, maneuver support and area support companies have provided enduring hazmat response and decontamination support to the U.S. Central Command area of responsibility. Since 2006, these same formations have supported homeland response requirements, providing trained

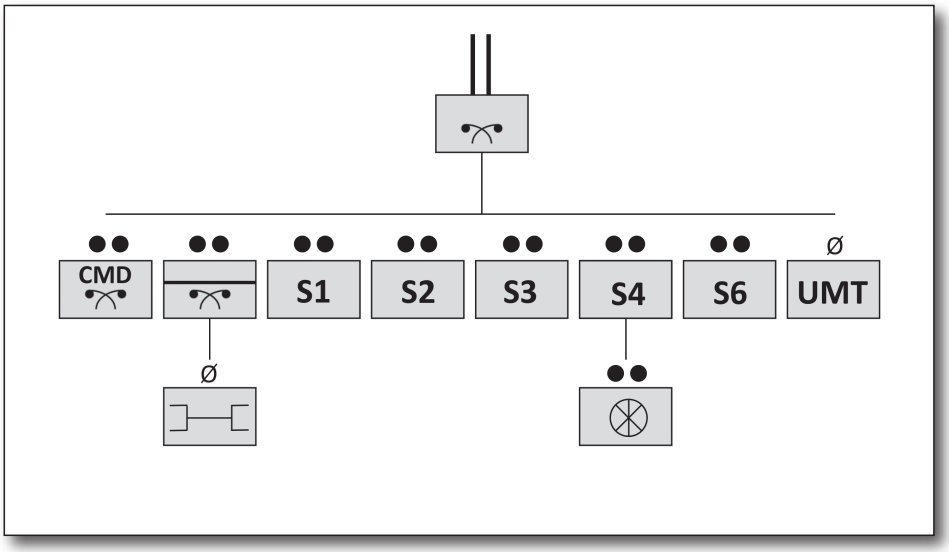


Figure 1. CBRN battalion organization

and ready forces to execute surveys, assessments, and mass casualty decontamination operations in support of the U.S. Northern Command. In addition, CBRN forces have been allocated to support global WMD elimination plans. To meet these requirements, these forces have been task-organized and equipped with nonstandard items including toxic industrial chemical protection and detection equipment, dismounted reconnaissance joint urgent operational needs statements, Mass Casualty Decontamination Systems, and Advanced-Threat Boxes. In order to institutionalize these capabilities and provide support for enduring requirements, the FDU focuses on reorganizing the maneuver support CBRN company into a hazard response company (Figure 2) that is manned, trained, and equipped to execute the missions.

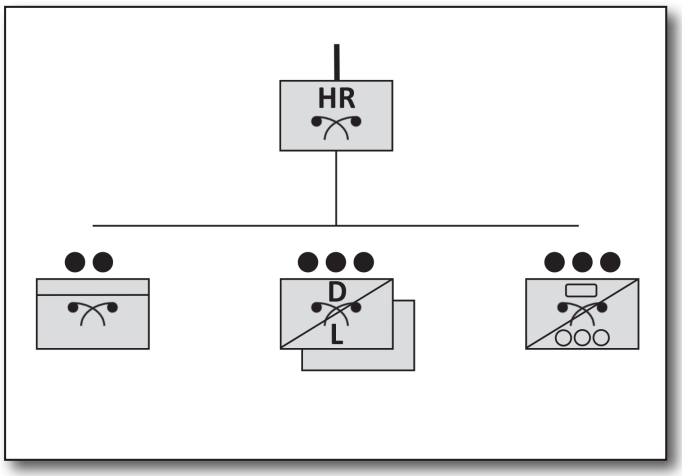


Figure 2. Hazard response (HR) company organization

The hazard response company is a multifunctional formation that provides hazard reconnaissance, surveillance, assessment, and decontamination support to formations at brigade combat team (BCT) levels and above. A hazard response company consists of an armored reconnaissance platoon and two 30-person multifunctional hazard assessment platoons. The number of nuclear, biological, and chemical reconnaissance vehicles per armored reconnaissance platoon has been reduced from six to four—a reflection of the decision to reduce the Army acquisition objective to 274 systems. The approved procurement and fielding of the nuclear, biological, and chemical reconnaissance vehicles more than doubles the capability of the 115 M93A1 Fox Nuclear, Biological, and Chemical Reconnaissance Systems that were previously employed by the Army and ensures that the Army National Guard and the U.S. Army Reserve are fully fielded. While the nuclear, biological, and chemical reconnaissance vehicle reduction decreases the planned capability, each BCT continues to be supported by an armored reconnaissance platoon, thereby resulting in no loss of operational capability to the force. Each hazard assessment platoon consists of two hazard assessment squads and two decontamination squads. The hazard assessment squads employee platoon dismounted reconnaissance sets, kits, and outfits to conduct dismounted reconnaissance, surveillance, and site assessment operations. The decontamination squads, which are equipped with two M26 Joint Service Transportable Decontamination System–Small Scale power drive decontamination apparatuses, can conduct supported operational decontamination and can support thorough decontamination operations. The hazard assessment platoon squads are capable of concurrently conducting hazard assessment and operational decontamination; however, based on personnel and equipment requirements, thorough decontamination is executed as a platoon mission. The hazard assessment platoon provides the BCT commander with a variety of options to detect, protect against, and mitigate CBRN hazards on the battlefield.

As with CBRN battalions, doctrinal support relationships with hazard response companies have changed. This allows the CBRN force to provide enhanced capabilities despite reductions in organization size. Maneuver support chemical companies have traditionally provided support to divisions. Under the CBRN FDU, each BCT doctrinally receives an armored reconnaissance platoon and a hazard assessment platoon. Based on tactical requirements, some BCTs also receive a company headquarters. These changes significantly enhance the ability of the BCT to protect against, respond to, and recover from CBRN hazards.

The CBRNE Company: Backbone of the Technical CBRNE Force

The last element of the CBRN FDU is the redesign of the chemical, biological, radiological, nuclear, and explosives (CBRNE) company (technical escort) (Figure 3). The intent of the CBRNE company redesign is to resolve issues derived from previous force management decisions and revise the company concept of employment. The FDU postures the CBRNE company to serve as the backbone of the CBRNE technical force well into the future.

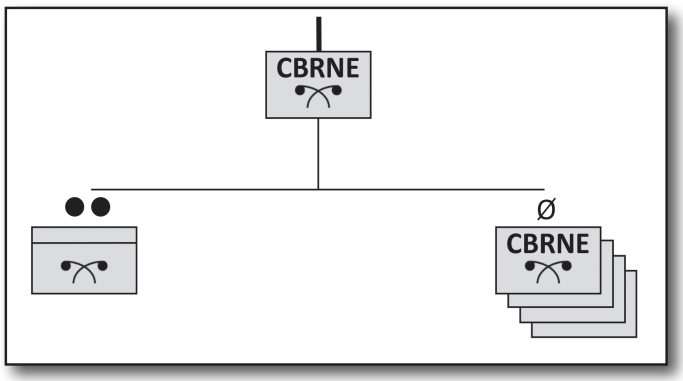


Figure 3. CBRNE company (technical escort) organization

In 2012, Regular Army CBRNE battalions were transformed from fixed force structures (organic companies) to composite structures consisting of a battalion headquarters and separate CBRNE companies. This transition was necessary due to the Headquarters, Department of the Army,

decision to station a CBRNE company on the Korean Peninsula. While CBRNE companies had been designated as separate, numbered companies, they lacked organic sustainment capabilities and continued to rely on their parent battalions for support. The CBRN FDU resolves this issue. Based on a manpower requirements criteria analysis, CBRNE companies are now provided organic maintenance and signal support.

Based on lessons learned in Korea and Iraq, the CBRNE company mission was changed from providing support to combatant commands and interagency partners to providing divisional support as a component of the CBRNE battalion.

"The CBRN FDU leverages lessons learned to provide a resource-informed, DOTMLPF-P–integrated, outcomes-based solution to support the warfighter."

This change allows the maneuver commander the full range of capabilities and creates a truly scalable and tailorable force that is operationally agile enough to mitigate risk to the force and to exploit opportunities at the lowest echelon.

Conclusion

For nearly a decade, the CBRN force has been in a constant state of change as it has undergone reorganization in support of contemporary operational requirements. In spite of this constant change, the Regiment has remained ill-suited to meet current requirements in support of the joint force. It has relied heavily on nonstandard DOTMLPF-P solutions that have placed an unnecessary burden on the operational force to develop and maintain capabilities. The CBRN FDU leverages lessons learned to provide a resource-informed, DOTMLPF-P–integrated, outcomes-based solution to support the warfighter. It does more than reorganize the block-and-line chart; it transforms the way we fight as a Regiment. The CBRN FDU optimizes the available force structure and rebalances the force to provide maneuver commanders with the tools needed to detect, protect against, and mitigate future CBRN threats.

Major Harwell is the CBRN concepts officer for the MSCoE, Fort Leonard Wood, Missouri. He holds a master of policy management degree from Georgetown University, Washington, D.C., and a master of management degree from the University of Phoenix.

("The 23d CBRNE Battalion: How We Train and Sustain," continued from page 16)

Conclusion

While training for two distinct wartime mission sets and meeting "Fight Tonight" deployment readiness requirements, the 23d CBRNE Battalion continues to gather lessons learned regarding the best ways to train and sustain the unit. The battalion makes use of a 6-month training cycle and information gained from annual exercises including Ulchi Freedom Guardian, 2ID WMD Elimination Microexperiment, Key Resolve, and Warpath to continue to refine tactics, techniques, and procedures and improve combined operations. But these practices are by no means the end state; they merely represent the beginning of an enduring ability to increase tactical and technical expertise while outfitting units for distinct wartime mission sets—all while enduring the continuous personnel turnover in Korea.

Endnote:

[1]The Army time management cycle consists of three phases:

- **Red.** The red phase, or support period, allows leaders to take advantage of all training opportunities to conduct individual Soldier, leader, and collective training; routine medical, dental, and administrative tasks are typically addressed during this period. Self-development is the key focus during the red phase.
- **Amber.** The amber phase, or mission training period, focuses on the lowest level of combat power, meaning that crews, squads, and platoons take part in educational and other training; scheduled maintenance and other critical readiness training tasks take place during this phase. The focus of the amber phase is more on the individual, with limited collective training opportunities.
- **Green.** The green phase, or prime time, focuses primarily on Soldiers and leaders; this type of training often includes collective tasks that are integrated through multiechelon training. Green-phase training always supports the mission-essential task list objective. Administrative and other activities are eliminated during the green phase to ensure that all Soldiers participate in the training.

Major Little is the S-3 officer, 23d CBRNE Battalion. She holds a bachelor's degree in chemistry from the U.S. Military Academy–West Point, New York, and a master's degree in chemistry from the University of North Carolina at Chapel Hill.

Major Pineda is the executive officer, 23d CBRNE Battalion. He holds a bachelor's degree in molecular biology from San Jose State University, San Jose, California, and a master's degree in environmental management from Webster University.

Nuclear Weapons Distance Learning Graduate Certificate Program

By Lieutenant Colonel John S. Leahy

The Air Force Institute of Technology (AFIT), Wright-Patterson Air Force Base, Ohio, is now offering a distance learning graduate certificate in Nuclear Weapons Effects, Policy, and Proliferation (NWEPP). The education of the nuclear workforce is a top U.S. Air Force priority, and the Air Education and Training Command, U.S. Air Force, conceived of the program to reinvigorate nuclear-related education for the Air Force nuclear enterprise. The first class was welcomed in the fall of 2011.

The NWEPP Program targets "nonquota," midcareer officers, noncommissioned officers, and government civilians who have current positions—or who may receive future assignments—with the Department of Defense (DOD) nuclear enterprise and who would not normally have any other way to pursue a formal education in the nuclear weapons arena. The program is open to students in residence at AFIT and candidates who are nominated by the Deputy Chief of Staff for Strategic Deterrence and Nuclear Integration Office (A10), Air Education and Training Command, in consultation with the Air Force Global Strike Command. Interested students who are outside the Air Force Global Strike Command must coordinate their attendance through AFIT and A10, Air Education and Training Command. U.S. Army nuclear and counterproliferation (Functional Area 52) officers coordinate through the U.S. Army Nuclear and Countering Weapons of Mass Destruction Agency. All students must be U.S. citizens. However, the only academic requirements are the completion of an undergraduate degree with an overall grade point average of 3.0 or higher and a college algebra level mathematics course with a grade of C or higher. There is no requirement for a science or engineering background. There is also no residency or security clearance requirement.

The NWEPP Program consists of three courses—each of which can accommodate up to 40 students, is 10 weeks long, and is worth 4 credit hours. Participants work independently and in groups to perform educational investigations of a broad range of topics encompassing weapon effects, nuclear technologies (including the fuel cycle), nonproliferation challenges, and the evolution of U.S. nuclear weapons policy since the Manhattan Project.[1] Students should plan to spend at least 16 hours per week on coursework. They will acquire the skills necessary to develop and provide advice on future nuclear strategy and policy. In addition, they gain an understanding of technical issues that will allow them to interface with the technical communities within DOD and the Department of Energy regarding the maintenance of the U.S. nuclear stockpile. They also learn what makes nuclear weapons unique. Finally, they develop an understanding for how these unique weapons have enabled the United States to deter war throughout the past 6 decades.

Dr. John McClory, director of the NWEPP Program, summarized his experiences by stating, "I have been gratified by the enthusiasm, knowledge, and dedication of our distance learning students as both an instructor and as the program director. Our students bring a wealth of knowledge on nuclear deterrence tactics, operations, and strategy—which they share and which elevates the level of discussion. Student contributions, along with our structured course material, make the program a valuable resource for those of any Service preparing for a position in the national nuclear enterprise."

The entire NWEPP Program can be completed in as little as 9 months, but must be finished no more than 2 years after beginning the first course. Those who complete the formal program with a minimum grade point average of 3.0 receive the AFIT graduate certificate.

For more information about the NWEPP Program, please visit the AFIT Web site at <http://www.afit.edu/> or contact Ms. Amanda Zehring, AFIT contractor, at <amanda.zehring.ctr@afit.edu> or (937) 255-3636, extension 4706.

Endnote:

[1]The Manhattan Project was a 1940s, U.S.-directed research and development project that led to the production of the first atomic bombs.

Lieutenant Colonel Leahy is a nuclear weapons effects analyst with the Nuclear and Countering Weapons of Mass Destruction Agency, Fort Belvoir, Virginia. He holds a bachelor's degree in civil engineering from Iowa State University.

Term	Credit Hours	Course Number	Course Title	Prerequisites
Fall, Winter, Spring	4	NENG 500	Nuclear Weapons Strategy and Policy	None; NENG 591 and NENG 596 recommended
Fall, Winter, Summer	4	NENG 591	Nuclear Weapons and Proliferation	None; NENG 596 recommended
Fall, Spring, Summer	4	NENG 596	Nuclear Weapons Effects	None

Table 1. NWEPP Course Requirements

CBRNE

Special Operations CBRNE Technicians Sought

The Special Mission Unit, Fort Bragg, North Carolina, is now accepting applications to serve as special operations chemical, biological, radiological, nuclear, and explosives (CBRNE) technicians. In this unique and challenging assignment, Soldiers will be required to perform force protection, site characterization, sampling operations, sensitive-site exploitation, decontamination of the force, and research and development of CBRNE equipment in support of tactical operations and serve as the commanders' advisors on all CBRNE matters.

This assignment requires an individual who is highly motivated, confident, intelligent, and capable of working without direct supervision in order to execute a mission of national priority. Soldiers selected to serve as special operations CBRNE technicians will undergo an extensive 12- to 18-month training program that involves all facets of the CBRNE community.

Soldiers assigned to the organization have a great opportunity to seek advanced training from military and civilian centers of excellence and will also be offered additional pay and accelerated promotion rates for the increased responsibility placed upon them.

Our organization is looking for the right Soldier to be a part of the Army's top CBRNE innovators and those who desire the challenge of conducting real-world operations.

Prerequisites include the following:

- **Voluntary application.**
- **Military occupational specialty of 74D (chemical operations specialist).**
- **Minimum age of 22 years.**
- **Minimum general technical score of 110 on the Armed Services Vocational Aptitude Battery.**
- **Rank of sergeant to sergeant first class.**
- **Ability to pass an Army physical fitness test with a score of at least 80 points in each event.**
- **U.S. citizenship.**
- **Airborne qualification or voluntary submission for airborne training.**
- **No recurring, adverse Uniform Code of Military Justice or financial actions.**
- **Possession of a secret security clearance and eligibility to obtain a top secret clearance.**

To submit an application, send an e-mail request to <sof1.recruiter@us.army.mil> with the name of your military occupational specialty in the subject line and the last four digits of your social security number included in the body of the e-mail.

***Editor's Note*: The text of this poster is hereby published with only minor edits for clarity.**

Why Integrate Hazmat Certification Into USACBRNS Curricula?

By Mr. Peter G. Schulze

Over the past few years, a growing number of people have questioned the continued integration of hazmat certification requirements into chemical, biological, radiological, and nuclear (CBRN) professional military education and functional courses at the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS). After all, they say, we aren't required to comply with hazmat or Occupational Safety and Health Administration rules when we deploy and are tactically engaged in CBRN operations overseas! Formal hazmat training (along with its associated testing requirements and certification) continues to be one of the most misunderstood and controversial blocks of instruction offered at USACBRNS. So . . . why do we continue to require hazmat training as a prerequisite or as a testable block of instruction for many of our courses?

According to U.S. Army Training and Doctrine Command (TRADOC) Pamphlet (Pam) 525-3-1, *The U.S. Army Operating Concept: Win in a Complex World—2020–2014*, military operations in complex environments require competent leaders and cohesive teams that thrive in conditions of uncertainty.[1] It isn't difficult for most CBRN specialists to imagine how CBRN threats and hazards can create conditions of uncertainty today and into the future. However, not long ago, our focus and training centered on a known set of nuclear, biological, and chemical (NBC) threats. Many former USACBRNS commandants realized that this narrow focus limited our understanding of modern operating environments at home and abroad. Brigadier General Stanley H. Lillie was the first commandant to develop training and education initiatives to broaden student understanding of what was becoming a wider and ever more complicated threat environment. Shortly thereafter, then Brigadier General Thomas W. Spoehr formally expanded the description of CBRN threats and hazards (see Table 1, page 24). He also recognized that the expanded description required a new way of thinking about the threat and how we equip, operate, train, and educate the Chemical Regiment. Consequently, the requirement to operate in and around the full spectrum of CBRN threats and hazards has been introduced, reinforced, or considered in every doctrinal, organizational, training, materiel, leadership development, and personnel solution since 2005.

Lessons learned from operations in Iraq and Afghanistan validated this new and expanded view of battlefield threats and hazards. CBRN operations that mitigated and limited insurgent access to nitric acid, other industrial chemicals and material, and radiological material supported the need for an expanded equipment set and an institutional curriculum capable of preparing CBRN Soldiers to deal with a wider threat spectrum. In Iraq, the terrorist use of improvised explosive devices and devices containing chlorine further reinforced and validated the need to operate in and around the full spectrum of CBRN threats and hazards. The spectrum of CBRN threats and hazards in the U.S. Army Central Command theater required a complete review of how we prepare CBRN specialists for current and future operations.

Hazmat training was introduced as a formal block of instruction in 2006 and expanded to select professional military education and functional courses during fiscal year 2007. The course material was initially very firefighter-centric—similar to courses at the Department of Defense (DOD) Fire Academy. However, the content evolved over the years to focus on the specific skills that CBRN specialists need to operate in areas with unknown hazards at home and abroad.[2] The formal block of instruction, which is loosely referred to as *hazmat*, was never really about certification; rather, it was always part of the training and education solution that helped enable our Soldiers and leaders anticipate threats and safely operate in the complexities of any CBRN environment. But we have lost sight of the original intent of the hazmat block of instruction—to the point that some individuals have come to view it as a separate entity outside of the tactical role of the Chemical Corps. This is a view that is inconsistent with our evolving doctrine, organization, equipment, and missions. It is also out of line with the diversity of CBRN hazards and emerging threats that our forces may encounter throughout the world. Hazmat training, education, and associated experiences are integral to CBRN specialists—no matter where the mission takes place.

CBRN Training and Education and Hazmat

TRADOC Pam 525-3-1 indicates that the potential for increasing the complexity of future conflicts and man-made catastrophes can be attributed to a number of factors, including an increasingly global environment, advancing

	C Chemical	B Biological	R Radiological	N Nuclear
Threats	C Chemical Weapons	B Biological Weapons		N Nuclear Weapons
	Weapons of Mass Destruction (Programs)			
	ICD	IBD	RDD RED	IND
	Improvised Devices			
Hazards	TIC	TIB	TIR	
	Toxic Industrial Materials			

Legend:

IBD—improvised biological device
ICD—improvised chemical device
IND—improvised nuclear device
RDD—radiological dispersal device
RED—radiological exposure device
TIB—toxic industrial biological
TIC—toxic industrial chemical
TIR—toxic industrial radiological

Table 1. CBRN threats and hazards

technologies, and the proliferation of readily available chemical, biological, radiological, nuclear, and explosives (CBRNE) material.[3] Army CBRN operations have historically been reactive in nature; as a result, most Army CBRN capabilities were designed to prepare for, and recover from, known NBC threats and hazards. Over the past few years, USACBRNS and the Regiment have initiated significant changes in doctrine, organization, training, equipment, and personnel requirements, trending toward a more holistic and proactive approach to preventing intentional and unintentional complications caused by the spectrum of CBRN threats and hazards. This effort continues to complement and be consistent with an expeditionary, tailorable, scalable Army that is prepared to meet the challenges of the global environment. However, to realize this capability, the institution must be able to quickly adapt, continuously revising and improving training and education.

USACBRNS has revised a significant portion of its curricula to complement these recent doctrinal, organizational, and materiel changes. Updated and improved instruction in chemistry, biology, radiological sciences, planning, reconnaissance, surveillance, emerging equipment and technology, personnel protective equipment, site entry, sampling, hazmat, clandestine laboratories, decontamination, countering weapons of mass destruction policy, and a host of other CBRN defense subjects are all part of a diversified and adaptive curriculum designed to produce skilled Soldiers and leaders who are capable of understanding emerging and evolving threats—not just to react during an emergency or an attack, but also to prevent a release or use of material that has the potential to harm people or the environment or complicate military operations. While most often associated with an emergency or reactive situation, the block of instruction that we call hazmat also includes critical planning and pre-incident assessment skills. USACBRNS hazmat training and education support the complete set of know-ledge, skills, and judgment needed to perform critical CBRN specialist leadership tasks. All CBRN training and education, including that portion referred to as hazmat, add to an understanding of the threat and prepare our Soldiers and leaders to safely apply critical technical, tactical, and operational expertise across the continuum of operations and staff assignments.

Many personnel have come to believe that hazmat training is synonymous with training that meets Occupational Safety and Health Administration regulatory requirements. Many more believe that Occupational Safety and Health Administration-compliant instruction is limited to the block of instruction that we call hazmat. However, the Code of Federal Regulations, Title 29, Subtitle B, Chapter XVII, Part 1910, Subpart H, Section 1910.120, paragraph q (29 CFR 1910.120[q]), *Occupational Safety and Health Standards*, *Hazardous Waste Operations and Emergency Response, Emergency Response to Hazardous Substance Releases,* clearly indicates that training shall be based on all the duties and functions to be performed by an individual in a hazardous environment. USACBRNS curricula and modules help close the historic gap from an all-hazards chemical, biological, and radiological procedural and protective equipment perspective, but do not include the full range of instruction needed for all the competencies expected of a CBRN specialist. Too many personnel would like to believe that providing training for the minimum competencies defined in 29 CFR 1910.120 meets the requirements for Army CBRN specialists in the homeland. This view is inconsistent with the law, Military Occupational Skill 74D qualification

requirements, and what we expect of our personnel when operating in the homeland or abroad. USACBRNS hazmat modules, courseware, and requirements exceed the minimum requirements associated with 29 CFR 1910.120(q). As such, only USACBRNS/DOD-executed or -validated courses meet Army CBRN specialist requirements. No other commercially available courseware has been approved by USACBRNS as meeting CBRN military occupational skill or hazmat-specific requirements.[4]

The priority for USACBRNS is to train personnel to be able to confidently execute Army and CBRN competencies across the range of military operations and, in doing so, provide them with the skills and knowledge needed to seamlessly work across DOD and with civilian and international partners. While optimized for the homeland, USACBRNS hazmat modules and courses form a critical component of the overall USACBRNS strategy to produce agile and adaptive professionals who are able to cope with the full spectrum of CBRN threats and hazards abroad and at home. The diversity of CBRN threats and hazards that our forces may encounter throughout the world demands that we prepare our Soldiers and leaders to safely apply their technical, tactical, and operational expertise across the continuum of operations.

The Challenge of Competency: The Case for Professional Hazmat Certification

As members of the Army profession, CBRN specialists are required to apply a substantial and diversified set of knowledge, skills, and competencies. Given the nature of the threat and the diverse expectations that we place on our Soldiers, the development of a comprehensive CBRN training and education program that is accessible along a career-long learning continuum is difficult at best. We learned long ago that, to successfully support operational adaptability, individuals must master and sustain specific core competencies, which are clusters of related knowledge and skills that significantly affect an individual's role and responsibility, correlate with performance on the job, and can be measured against accepted standards. For USACBRNS, the challenge has historically been to balance the diverse CBRN content that *can* be taught with what *needs* to be taught. The identification, development, and testing of core competencies helps USACBRNS define, measure, and refine critical learning outcomes within the many modules and courses. Core competencies are typically connected to one or more key functions that help define the mission of an organization. Key functions of the Chemical Regiment include—

- Advising commanders on CBRN defense and countering weapons of mass destruction missions.
- Conducting CBRN reconnaissance, surveillance, and assessments.
- Conducting activities that prepare and protect friendly forces against CBRN hazards.
- Performing CBRN consequence management activities.

One of many CBRN core competencies involves the ability to understand, visualize, and describe CBRN hazards within an operational context to inform and advise the commander and to safely conduct operations in an all-hazards CBRN environment. Hazmat training, education, and experiences form an important part of that competency. The process used to develop, validate, and institutionalize our hazmat-specific modules and courses and their associated assessments was a deliberate and anticipatory USACBRNS effort—in part to meet the larger strategic goal, but also to ensure interoperability across DOD and with our civilian partners. The need for interoperability was influenced by existing DOD regulations and agreements with the International Fire Service Accreditation Congress (IFSAC). USACBRNS hazmat-specific modules and course content are accredited by IFSAC through the U.S. Air Force Civil Engineer Center. As a result, depending on the course, USACBRNS is able to offer various levels of certification in hazmat response.

The terms *accredit*, *certification*, and *certify* are often misapplied and used interchangeably. To accredit is to give official authorization to, or approval of; to provide with credentials; to recognize or vouch for, as conforming to a standard; to recognize, as maintaining standards that qualify graduates for admission to higher or more specialized institutions or for professional practice. Certification is a formal, written confirmation by a proponent organization or certifying agency that a team or individual is capable of performing assigned critical tasks to prescribed standards. The team or individual must demonstrate the ability to perform the critical tasks to standards before certification is issued. According to 29 CFR 1910.120, to certify implies that the employer shall provide written certification to personnel who have successfully completed the training. The bottom line is that, as the proponent, the commandant certifies that graduates of USACBRNS courses have successfully met prescribed course standards.

While the commandant ultimately certifies all USACBRNS graduates, the instructional and testing processes have been accredited by IFSAC, which allows the commandant to provide separate and distinct DOD/IFSAC certificates and seals in addition to the USACBRNS graduation certificates. The issuance of professional IFSAC certifications associated with USACBRNS hazmat instruction was a natural progression that was initially based on a defined and justified need by Army National Guard civil support teams—and eventually by DOD/Army—to provide professional and occupational recognition for the completion of a structured program of study. If the Army invests significant resources to develop and provide formal CBRN training and education and students invest significant intellectual capital to meet existing course standards, then it seems reasonable that the institution should provide for professional certification when available. While USACBRNS hazmat courseware was designed to meet DOD/Army-specific requirements and competencies, synergetic developmental efforts created conditions and content that met the predetermined qualifications of various government agencies and the emergency response profession.

The National Defense Authorization Act for Fiscal Year 2012 authorized DOD to assess the feasibility of permitting Service members to obtain civilian credentialing for skills required for military occupational skills. This DOD initiative was designed to help Service members acquire a private-sector profession. However, USACBRNS had already recognized that the methodology used to achieve professional hazmat certification helps improve the quality of CBRN specialists. Furthermore, we have been providing this certification service to our students for more than 9 years. Army, U.S. Marine Corps, U.S. Navy, Air Force, and U.S. Coast Guard personnel from all components attend USACBRNS courses, where more than 4,500 hazmat-related certificates are issued per year. Most students who earn a DOD certificate and IFSAC seal experience a sense of accomplishment. However, some students and instructors feel uncomfortable because the tests are generated by a computer, test questions require a more comprehensive understanding of the material, instructors have no control over testing procedures, and the testing program is not reflective of traditional Army tests. This discomfort with the test and a misunderstanding about how and why the content was developed contribute to the controversy surrounding the entire hazmat program. Students have become too accustomed to a testing program that does not hold them accountable for their learning. For example, they have come to expect open-book tests, simple multiple-choice questions that are sequenced with handouts, and casual instructor performance observations rather than rigorous performance-based testing.

The importance of incorporating valid and reliable assessments into a learning program cannot be overstated. The proliferation of readily available CBRNE material through advancing technologies and globalization demands that USACBRNS continuously revise content and maintain the ability to accurately measure learning. As USACBRNS further refines content through the development of well-defined CBRN competencies, considerable care must be taken to also develop secure, technology-enabled, integrated assessments that are tailored to that content and to the expected outcomes. The current hazmat assessment program, which serves as a model for the future, must also be expanded to include other key competencies.

Summary

Stating that USACBRNS hazmat courseware is a model for the future and claiming that it produces competent professionals is not enough. We must be able to demonstrate that students have achieved the competencies necessary to safely apply critical technical, tactical, and operational expertise. USACBRNS courseware and methodology are open to external scrutiny by the Quality Assurance Program, TRADOC; the Air Force Civil Engineer Center; and IFSAC. It is the USACBRNS commandant who certifies that all hazmat program graduates have successfully met required standards; however, USACBRNS has engaged key partners to provide civilian credentialing for our graduates who have met those standards.

So . . . Why do we integrate hazmat certification requirements into CBRN professional military education and functional courses? To be clear: Hazmat is not about certification; rather, hazmat is a part of our curricula that is necessary to help CBRN Soldiers and leaders safely apply their technical, tactical, and operational expertise in a risk-informed manner across the continuum of operations. The USACBRNS commandant certifies that all graduates have successfully met module and course standards, including those of the hazmat portion. As we provide this critical component of our curricula, we concurrently provide our personnel with well-deserved national and international recognition for accomplishing a rigorous course of instruction and the associated testing requirements. If we expect our Soldiers and leaders to anticipate threats and operate safely in the complexity of any CBRN environment, shouldn't we deliver the best and most comprehensive curricula possible—and the added recognition provided by a recognized accrediting agency?

Endnotes:

[1]TRADOC Pam 525-3-1, *The U.S. Army Operating Concept: Win in a Complex World—2020–2040*, 31 October 2014.

[2]The current USACBRNS hazmat curriculum is compliant with National Fire Protection Association 472, *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*, 2013 Edition, and with specific equipment requirements unique to CBRN operations.

[3]TRADOC Pam 525-3-1.

[4]According to Army Regulation 350-1, *Army Training and Leader Development*, dated 19 August 2014, the requesting agency will ensure that the program of instruction offered by a contractor is approved by TRADOC and the proponent.

References:

29 CFR 1910.129(q), *Occupational Safety and Health Standards*, *Hazardous Waste Operations and Emergency Response, Emergency Response to Hazardous Substance Releases.*

Department of Defense Directive (DODD) 1200.16, *Contracted Civilian-Acquired Training (CCAT) for Reserve Components*, 20 March 2004.

The National Defense Authorization Act for Fiscal Year 2012, 31 December 2011.

TRADOC Pam 525-8-2, *The U.S. Army Learning Concept for 2015*, 20 January 2011.

Mr. Schulze is the technical director of USACBRNS, Maneuver Support Center of Excellence, Fort Leonard Wood, Missouri. He holds undergraduate degrees in electrical engineering from the Oregon Institute of Technology and history from Virginia Polytechnic Institute and State University and a master's degree in education from Virginia Polytechnic Institute and State University.

The Need to Conserve Water During CBRN Decontamination

By Captain William H. Horne

The Problem

With renewed emphasis on chemical, biological, radiological, and nuclear (CBRN) tasks and training in U.S. Army unified land operations doctrine, the U.S. Army Chemical Corps must review the CBRN tasks and associated doctrine to ensure that CBRN operations benefit the overall Army mission—with special attention paid to the logistical needs of CBRN decontamination. According to Field Manual (FM) 3-11.5, *Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination*, the most resource-intensive type of decontamination conducted in a combat setting is detailed equipment decontamination (DED), which requires a considerable quantity of water. For example, an average mechanized infantry company, which consists of 12 M2A3 Bradley fighting vehicles, could require up to 7,800 gallons of water for DED.[1]

As seen in recent operational environments, water can be a scarce resource and significant logistical systems and efforts can be required to deliver it to our forces. Continuing with the mechanized infantry company as an example, a chemical decontamination platoon would need to fill both of its 3,000-gallon water storage blivets and receive a resupply from a 2,000-gallon Load-Handling System Compatible Water Tank Rack (Hippo) to meet the company's water needs for DED.[2] This would require the identification of a sufficient water source and multiple supply convoys to transport the water to the decontamination site.

Of equal importance is the further environmental burden that the use of the water places on the local population. CBRN weapons cause significant environmental damage themselves; used decontaminants, contaminated expendables, and runoff resulting from decontamination operations could leave additional long-lasting contamination. Calculations indicate that the 7,800 gallons of water needed for mechanized infantry company DED would require 1,092 cubic feet of sump storage once DED is complete.[3] This would be equivalent to two 5-foot by 10-foot by 10-foot holes filled with decontaminants, used cleaning equipment, and contaminated water with which local nationals would need to contend. This would not be an example of leaving the site cleaner than we found it.

Solutions

There are several options that the Army can consider to improve water conservation during decontamination, thereby reducing the overall water need and the amount of waste left behind. Two major areas of focus are—

- Reviewing and revising Army doctrine regarding decontamination tactics, techniques, and procedures.
- Developing and fielding new technology to help reduce and reuse water during decontamination operations.

Reviewing and Revising Doctrine

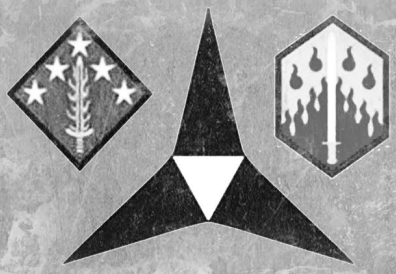
In reviewing and revising doctrine in an effort to significantly reduce overall water usage during decontamination, the Chemical Corps needs to address two topics. First, we need to consider adjusting decontamination tactics, techniques, and procedures. For example, we might promote more efficient water use by developing changes to tactics, techniques, and procedures associated with DED Stations 1 (Primary Wash) and 4 (Rinse).[4] Scraping gross contaminants (dirt, mud, plant matter) off equipment in a controlled area before embarking upon Step 1 could reduce the quantity of water needed to pressure wash the contaminants from the equipment. Furthermore, using a biodegradable scrub brush to wipe decontamination agents from equipment before reaching Step 4 could reduce the amount of water needed to rinse the decontamination agents off the equipment. Once all water conservation methods are established, we must then conduct an overall review of the improved decontamination tactics, techniques, and procedures so that we may adjust the doctrinal water consumption rates provided in FM 3-11.5. Modified DED water consumption rate estimates would allow staff sections to better plan for DED operations and help ensure that only the amount of water needed would be hauled to the site.

Developing and Fielding New Technology

To further benefit water conservation efforts, technological improvements should be implemented to supplement and support the doctrinal improvements to decontamination. Two areas of technological development could significantly improve the ability to conserve water during decontamination operations. The quantity of water required to decontaminate each piece of equipment could be reduced through the use of improved pump and sprayer technologies, which make it possible to consistently deliver smaller amounts of water with greater pressure to larger surface areas. A good example of such a technology is the M26 Joint Service Transportable Decontamination System–Small Scale. However, we need to keep searching for improvements in this arena and implement them as needed. In addition, the water used for decontamination could be reclaimed and reused and the Army should examine those possibilities for additional water conservation gains. Reclamation involves the use of catch basins (similar to those commonly placed beneath refueling vehicles) to collect the runoff generated at DED Stations 1 and 4. Reclaimed water can then be pumped through an activated carbon or membrane filter to remove chemical and biological agents, resulting in water that is

(Continued on page 30)

THE ROLE OF CBRN IN THE RESURGENCE OF THE ARMY OPERATIONAL MANEUVER CORPS



By Major Tiffany L. Dills and Captain Li Xu

CBRN Staff and Processes

In recent years, extraordinary advances have been made in the technical training and equipment of chemical, biological, radiological, and nuclear (CBRN) Soldiers at the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS). However, the return of Army warfighting commands to unified land operations will likely require another change in U.S. Army Chemical Corps focus. Although we will continue to need adaptable leaders who are technical experts and certified in all areas of CBRN and weapons of mass destruction threats, we cannot forget the fundamentals of CBRN defense, which comprise the credentials of all CBRN Soldiers. As a Regiment, we must make a deliberate effort to refresh our basic skills, such as completing analog CBRN hazard plots, taking CBRN protective measures in support of operational maneuver, and determining the effects of weather on CBRN materials and agents on the battlefield. As we continue to reduce our force structure, our ability to provide technical advice and guidance to maneuver commanders remains paramount. The proper alignment and employment of CBRN assets will continue to be the key to the success of the Chemical Corps.

In the fall of 2014, III Corps, Fort Hood, Texas, initiated the "Road to Unified Land Operations" training plan with a series of staff training events, a staff training exercise, and participation as a joint forces land component command headquarters/high command during Army Warfighter Exercise 15-2. In February 2015, the corps again served as a joint forces land component command headquarters in the evaluated training event, Warfighter Exercise 15-3. While the technical capabilities of the corps CBRN staff were sound, the staff required additional focus to regain proficiency in a number of tasks. Similarly, the corps staff was collectively unfamiliar with some of the technical aspects of CBRN defense that have not normally been employed in the last decade of counterinsurgency-centric operations.

The joint forces land component command headquarters staff was required to provide the commander and subordinate units with timely and accurate information regarding the potential impact of CBRN employment by enemy forces and unconventional threats. Although other staffs possessed a cursory understanding of chemical agent effects, they lacked a comprehensive understanding of the effects of temperature, weather, and terrain on the use of CBRN munitions. Most understood the importance of agent type and wind direction in determining risk, but few understood the implications and effects of extreme temperature on chemical weapons. They were also unfamiliar with the chemical weapons employment doctrine of our adversaries; therefore, it was necessary for the joint forces land component command CBRN staff to share such knowledge in an effort to shape input into the daily targeting work group. While the III Corps CBRN staff is now trained in aspects of chemical protection, additional training is needed to improve readiness in addressing the more complex risk of exposure to radiological dispersion devices and nuclear materials.

Participation in the events leading up to Warfighter Exercise 15-3 forced the CBRN Section, III Corps, to review, understand, and implement comprehensive protective measures to ensure optimum support to the operational maneuver forces. To best advise commanders at all levels, the III Corps CBRN staff must be technically competent in a broad range of technical tasks. Given a complex, noncontiguous battlefield, CBRN officers and noncommissioned officers must be able to rapidly assess risks associated with the entire spectrum of chemical agents, toxic industrial chemicals, biological threats, and radiological materials. CBRN personnel must then be able to translate those risks into operational terms and make sound recommendations to commanders in order to limit exposure and risk while maintaining momentum and freedom of maneuver. In completing these tasks, there is no substitute for the proper preparation of staff tools. Our automated tools provide powerful capabilities for managing operations and plotting hazards; however, to meet the requirements of a mechanized or armored force, the CBRN staff must also be capable of completing the hasty (sometimes nearly immediate) templating of downwind hazards for chemical and radiological contamination. Through the application of timely recommendations, followed by more detailed modeling from reachback organizations such as the Defense Threat Reduction Agency, the CBRN staff best supports the mobility of the maneuver forces. As always, staff integration and coordination remain critical. For example, the CBRN section must ensure that analysts from the intelligence office (G-2) recognize indicators and warnings and understand weapons of mass destruction employment doctrine. In addition, the fires planners, corps targeting officers,

An armored vehicle-launched bridge is moved into position during a gap-crossing operation. (Photo by Ms. Dawn Arden, Fort Leonard Wood *Guidon*.)

and U.S. Air Force liaisons must understand why—and when—it is important to target and eliminate enemy CBRN decontamination assets. And the staff weather officer must understand the effects of wind speed, wind direction, temperature, and weather conditions on chemical munitions.

Missing Element

An area that remains inadequately addressed is that of battlefield obscuration. With only two smoke generator companies remaining in the total Army force (both within the Army National Guard), the Army lacks the ability to adequately plan and execute lengthy smoke missions in support of gap crossings or breaching operations. The Field Artillery and Engineer Branches are currently attempting to eliminate the obscuration capability shortfall. However, in the meantime, maneuver commanders continue to expect a reliable, persistent, and survivable asset that can support gap-crossing operations. Although Mission Command Training Program scenarios allow for the allocation of smoke units to maneuver formations, commanders and staffs have not received current practical training in smoke employment. Moreover, the fact that CBRN staffs lack sufficient training and experience to plan obscuration for commanders is of even greater concern. The lack of capability within the force has resulted in a generation of leaders who have little practical experience in the employment of long-duration obscuration. Consequently, the commander of III Corps has joined a growing list of commanders who are asking the Army to close the capability and simulation gaps. The U.S. Army Capabilities Integration Center must propose and support the return of obscuration assets to help fill this capability gap and to make rapid and tangible progress toward closing it.

Doctrinal Employment

Current doctrine and structure address only two-command post configurations. However, as training progressed for the III Corps staff and subordinate units, the corps commander quickly determined that a third element was necessary in order to provide adequate command oversight of corps security area activities that directly impact the ability of the corps to maintain momentum and preserve combat power. Therefore, the commander implemented a mission command concept that employs three command posts—a main command post, a tactical command post, and a corps support command post. Each command post is capable of executing all III Corps warfighting functions, allowing the commander the flexibility to move around the battlefield. The III Corps CBRN staff ensures robust and continuous support across the security, close, and deep fights through

each command post. As the Army moves forward with structure changes, USACBRNS and the U.S. Army Training and Doctrine Command should account for the three-command post configuration and adequately resource the CBRN and protection staffs for the mission.

New Paradigms

The regional alignment of chemical, biological, radiological, nuclear, and explosives (CBRNE) coordination elements from the 20th CBRNE Command was a welcome addition to the exercises. The CBRNE coordination element mission is to provide predictable and dependable capabilities to the III Corps staff in the form of deployable and scalable assets with specific experts focused on CBRN operational planning, coordination, synchronization, and technical reachback. Observations from the last three warfighter exercises indicate that CBRNE coordination elements are valuable in augmenting the III Corps CBRN staff and in filling voids in its technical capabilities. They provide detailed future planning and coordination—especially with regard to the transition to Phase IV operations—while the III Corps CBRN staff manages and tracks current operations on the battlefield. The continued integration of the CBRNE coordination element asset into all corps operations will help fully develop a habitual relationship and greatly improve the technical skills available to the corps staff. Likewise, the regional alignment of the 48th Chemical Brigade as a habitually supporting III Corps asset will further enhance training opportunities and provide greater depth in III Corps planning for future operations involving CBRN and weapons of mass destruction threats.

Application of Learning

After more than a decade of combat on many fronts, it is essential that the Chemical Corps revisit the basics of decisive-action operations. Warfighter exercises can be used to drive a return to proficiency in decisive-action missions requiring combined arms maneuver. We must be able to support a dynamic scheme of maneuver and employ our assets wisely to ensure that maneuver commanders are not hampered by CBRN conditions in their operational areas. CBRN staffs must arm themselves with the tools necessary to apply their technical skills to current operations, but they must also make an effort to recapture those skills that—while no longer prominent in our training programs—remain critical to the success of combined arms maneuver operations.

Major Dills is a CBRN officer, III Corps, Fort Hood, Texas. She holds a bachelor's degree in biology from Hampton University, Hampton, Virginia, and a master's degree in environmental management from Webster University.

Captain Li Xu is a CBRN officer, III Corps. He holds a bachelor's degree in criminal justice from Texas State University and a master's degree in environmental management from Webster University.

("The Need to Conserve Water. . . ," continued from page 27)

clean enough to be reused for DED. The filters must be portable and easily replaceable, and they must allow a high enough flow rate that the rate of production of reusable water does not delay decontamination operations. With this process, units could decontaminate any number of vehicles using only the amount of water generally needed for one vehicle.

Conclusion

The Army could tactically, operationally, and strategically benefit from practicing improved water conservation techniques during CBRN decontamination. By reducing overall water usage through refined doctrine and improved technology, we can ease the logistical strain of moving large amounts of water through operational environments while also reducing the environmental impact that decontamination operations have on the local population. Decreased logistical burdens and reduced impacts on local populations through improved water conservation during CBRN decontamination will strengthen the ability of the Army to effectively conduct unified land operations.

Endnotes:

[1]FM 3-11.5, *Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination,* 4 April 2006.

[2]Ibid.

[3]Ibid.

[4]Ibid.

References:

Army Tactics, Techniques, and Procedures (ATTP) 3-21.71, *Mechanized Infantry Platoon and Squad (Bradley)*, 9 November 2010.

"Joint Service Transportable Decontamination System: JSTDS-SS," fact sheet, Chemical, Biological, Radiological, and Nuclear Information Resource Center, Washington, D.C., 7 March 2012, <http://jacks.jpeocbd.osd.mil/Public/FactSheetProvider.ashx?productId=314>, accessed on 28 April 2015.

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At the time this article was written, Captain Horne was a student in the CBRN Captain's Career Course, Fort Leonard Wood, Missouri. He will be assigned as the CBRN officer, 1st Air Cavalry Brigade, 1st Cavalry Division, Fort Hood, Texas. He holds a bachelor's degree in chemistry from the University of Pittsburgh, Pittsburgh, Pennsylvania.

What's in a Name? Our Corps Identity and Missions

By Mr. Kip A. Lindberg

During World War I, the Industrial Revolution and the technology of mass production combined to make it possible for vast quantities of toxic chemicals (which had historically been used only sporadically) to be produced and distributed over a wide area—meaning that the chemicals were feasible for use as weapons of war. On 22 April 1915—8 months into the agony of the war—large-scale gas warfare was first initiated near the village of Ypres, Belgium.

On the other side of the Atlantic Ocean, the U.S. War Department was gathering information about the development of gas warfare in Europe. But because the United States was hoping that there would be no need to become involved in the war, the War Department did not initiate research into offensive uses of gas or the design, testing, and production of protective equipment for American forces. Therefore, when the United States declared war on Germany on 6 April 1917—nearly 2 years after the gas attack on Ypres—we did so with no plan for producing or using chemical weapons or for providing sufficient chemical defense training or equipment to protect our force.

On 7 April 1917 (the day after the U.S. declaration of war) the War Department began a belated effort to address gas protection by absorbing the U.S. Bureau of Mines from the U.S. Department of the Interior. The Bureau of Mines was the only U.S. organization that was familiar with the problem of gas protection; the agency had studied the issue and produced equipment to protect mine workers from naturally occurring, subterranean, poisonous gases. The Bureau of Mines began designing, testing, and producing protective masks in support of our national defense. Dozens of colleges and universities famed for their strong chemistry programs were asked to combine their research efforts at the American University Experiment Station in Washington, D.C., to develop potential war gases and absorptive filters. The U.S. Army Ordnance Corps was tasked with procuring war gases and developing munitions for delivering them on the battlefield. The U.S. Army Corps of Engineers was tasked with developing tactics for offensively delivering war gases on the battlefield. Meanwhile, the U.S. Army Medical Department procured defensive equipment and trained Soldiers in chemical defense, while the U.S. Army Signal Corps developed chemical alarms. The diversified and uncoordinated efforts of various stateside agencies and Army branches independently working on chemical warfare projects were finally brought together with the establishment of the Chemical Service Section on 16 October 1917. This was the first time that chemistry had been recognized as a separate branch of military service. The following December, the Chemical Service Section was authorized a distinctive insignia—a benzene ring superimposed in the center of crossed retorts, which was widely considered appropriate and representative of the chemical mission. While the officer in charge of the Chemical Service Section was tasked with coordinating activities, he had no real authority to command the activities of the directorates under him.

On 3 September 1917, a Gas Service was created in France to liaise with allies in matters of gas warfare and to coordinate the offensive use of gas by the American Expeditionary Force. While those in the Gas Service were also authorized to wear the new benzene ring and crossed retorts insignia, they were less than pleased with its design and symbolism. They felt that their mission had less to do with science than with their warfighting capability of dealing poisonous gases on their enemy. Consequently, they designed and submitted their own insignia—a dragon head above a pair of crossed poison-gas shells—for approval. However, acknowledging no distinction between the missions, the War Department disapproved the Gas Service request.

Still, through the spring of 1918, stateside research and development and overseas offensive gas operations continued independently and efforts were made on both sides of the ocean to authorize a single, overarching, corps level agency. The chief of staff did not initially favor the creation of a chemical corps; but on 28 June 1918, the War Department officially authorized the Chemical Warfare Service (CWS) to serve as the single agency for the U.S. gas warfare program. The CWS was now responsible for the research and development, procurement, and supply of all chemicals to the Army and for providing training in offensive and defensive aspects of chemical warfare.

In a span of 18 months, America's chemical warfare program was born, languished under uncoordinated mission responsibilities and confusing name changes, flourished with the consolidation of missions under a unified authority, and eventually emerged atop the world chemical warfare arena at the end of the war.

However, the future of the CWS had not been secured. Older military leaders who had received their military education before the development of the chemical industry in the late 1800s viewed chemical warfare as undignified. They preferred to ignore the possibility that chemicals would remain a weapon of civilized warfare. And many believed that the proposed peacetime activities of the CWS could well be handled by the Corps of Engineers. However, the strongest proponents of the CWS insisted that chemical warfare was an emerging and expanding threat and that it was here to stay. They declared that Pandora's box had been opened and that there was no going back. They argued that our Nation could prepare for another chemical battle or suffer the consequences. If transferred to another branch, they claimed that chemical warfare would be relegated to secondary importance behind the primary mission of that branch. Congress agreed with the proponents and, with the National Defense Act of 1920, established the CWS as a permanent branch of the Army. Due to the research and development advances that CWS made during the war, the additional missions of developing and producing all smoke and incendiary materials were added to the chemical missions.

There were no further CWS name changes during the next 2 decades, although an effort was made in 1937 to redesignate the CWS as the Chemical Corps to conform to the naming convention that was already in use for other Service branches. The proposed measure was passed by Congress, but did not meet with President Franklin D. Roosevelt's approval. With the Nation in the grip of the Great Depression and with war clouds again gathering over Europe and Asia, the President believed that the name change was contrary to sound public policy, preferring instead to hope that civilized nations would one day outlaw the use of chemicals in warfare. While he acknowledged the need for the CWS to study war gases for defensive purposes in the event they were used against the United States, President Roosevelt was, after all, a politician who did not wish to endure public ill will by authorizing what might be viewed as one more federal boondoggle in preparation for another world war. He believed that the name change could be politically costly; therefore, the proposal was dropped.

Despite the President's public declaration of his sincere hope that international peace conventions would make the abolishment of the CWS possible, CWS missions were further expanded. The development of aircraft that could fly farther and faster elevated the role of chemicals as military weapons. The development of aerial chemical weapons—and the development of defenses against them—became increasingly important. In addition, the CWS also provided useful services to the American people through public health and law enforcement research and projects. It was widely believed that the chief value of the CWS was in its message of deterrence to potential enemies—the message that a chemical weapons attack on the United States would be met, defeated, and countered by our own chemical weapons. The CWS was essentially our national insurance policy, whose premiums were reluctantly paid as a hedge against the unthinkable. However, at no point was the CWS safe from the threat of future disestablishment.

The size and missions of the CWS expanded greatly upon U.S. entry into World War II. From 1942 to 1945, the CWS increased in size from 7,500 to 65,000 Soldiers. For the CWS to play a greater role in combat operations, high-explosive rounds were developed for the 4.2-inch chemical mortar; incendiary bombs provided the U.S. Army Air Force with an ideal weapon for the strategic bombing of enemy industries. The CWS was also officially tasked to act as an advisor on the chemistry of explosives and to develop training programs and contingency plans to counter chemical attacks on the continental United States. Furthermore, the weaponization and use of biological agents by the Japanese in China and the development of similar weapons in Germany prompted the War Department to initiate the development of America's biological research program under the CWS. With the close of World War II came revelations concerning the Nazi discovery, production, and stockpile of nerve agents; the development of the atomic bomb; and the beginning of the Cold War with the Soviet Union and its communist satellite countries.

But unlike the period following World War I, there was no organized movement to dissolve the CWS after World War II. The proliferation of chemical weapons, the development of nerve agents, the destructive force of strategic bombing with incendiary and nuclear weapons, and the spread of communism combined to render that notion impractical. Instead, on 20 August 1946, Public Law 607 was signed and the name of the CWS was officially changed to the Chemical Corps. The name of the branch school was also changed from the Chemical Warfare School to the Chemical Corps School at that time. In 1949, the Soviet Union's successful production and detonation of an atomic device posed another threat to the United States and created another mission for the Chemical Corps—that of radiological detection, protection, and decontamination.

Throughout the decades of the Cold War, the Chemical Corps struggled to balance the need to prepare for involvement in a chemical, biological, or atomic conflict with the American public perception regarding what was safe and philosophically acceptable. Did the threat of the foreign use of these agents justify the risks associated with producing, testing, and stockpiling chemical and biological weapons? Operating under the belief that international conventions could now legislate and enforce a prohibition of chemical and biological weapons, the United States eventually agreed to cease production and institute a stockpile destruction program. With this decision, the Chemical Corps relinquished the offensive preparation mission that had been a pillar of its existence since 1918; however, the decision allowed the Chemical Corps to focus its efforts purely on defense.

The Chemical Corps School also underwent changes during the Cold War. The location of the school changed from Edgewood Arsenal, Maryland, to Fort McClellan, Alabama; and the name of the school changed to the

U.S. Army Chemical Corps School in 1957 and then to the U.S. Army Chemical School in 1963. A final change in location to Fort Leonard Wood, Missouri, occurred in 1999; and a final change in name to the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS) took place in October 2007. The new name reflects the wide range of training and expertise offered to students of the Chemical Corps.

In 1981, the Army Chief of Staff approved the concept of an Army-wide regimental system in which each Soldier maintains continuous identification with a single regiment and is supported by a personnel system that increases the Soldier's probability of serving recurring assignments with his or her regiment. Under Army Regulation (AR) 600-82, *The U.S. Army Regimental System*, branches were to retain their corps titles while incorporating the spirit and intent of the Regimental System into their corps; that is, they were to provide for Soldier opportunity and professional development and for a historical affiliation that was meaningful to the Soldier. As part of the implementation of the Regimental System, the regimental crest of the 1st Gas Regiment—which consisted of the Green Dragon and the gas-wrecked and shot-marked tree trunk—was selected as the distinguished unit insignia of the Chemical Corps.

We are the Chemical Corps. We have been the Chemical Corps since 1946, although we existed under other names before that. And we will continue to be the Chemical Corps until Congress decides to change our name. Although some of our missions have changed throughout the past 97 years, one mission has remained the same—the mission to protect the United States from the unconventional use of chemical, biological, radiological, and nuclear (CBRN) threats and hazards.

Our Soldiers perform CBRN missions throughout the Army and joint force. Although they may wear the CBRN brassard, they do so as Soldiers of the Chemical Corps. Since the adoption of the Regimental System, no matter where our Soldiers serve—at USACBRNS, with the 4th CBRN Company in Korea, with the 401st CBRN Company in Kuwait, or on staff duty with U.S. Africa Command—they are members of the Chemical Corps, protecting the force, wearing our distinctive unit insignia, and adding to the proud history of the 1st Gas Regiment.

References:

AR 600-82, *The U.S. Army Regimental System*, 1 May 1986.

National Defense Act of 1920, 4 June 1920.

Public Law 607, 20 August 1946.

Mr. Lindberg is the director of the U.S. Army Chemical Corps Museum, Fort Leonard Wood, Missouri.

Authorized Wear of the CBRN Brassard

By Master Sergeant Charles E. Hall

The chemical, biological, radiological, and nuclear (CBRN) brassard, which replaced the antiquated GAS brassard, was first authorized for wear on 11 August 2008. According to Department of the Army (DA) Pamphlet (Pam) 670-1, *Guide to the Wear and Appearance of Army Uniforms and Insignia*, "Brassards are authorized for wear only while actively engaged in the duty associated with the brassard and identification of personnel is required, such as field operations and event response."[1] Brigadier General Maria R. Gervias, Chief of Chemical, has indicated that enlisted Career Management Field 74 (chemical operations specialist) Soldiers or officers/warrant officers within Army Branch 74 (CBRN officer) must be serving a 74-coded billet and be directly involved in CBRN operations by being engaged in the planning, assessing, characterizing, advising, and mitigating of CBRN threats and hazards inside or outside the continental United States to be authorized wear of the CBRN brassard. Some have interpreted this guidance to mean that any 74-series Soldier serving in a 74-series billet is authorized to wear the CBRN brassard on his or her service uniform at all times. This is not the intent of the Chief of Chemical.

The Chief of Chemical intends for the CBRN brassard to serve as a means to immediately identify CBRN Soldiers who are actively providing specialized technical expertise during emergencies or CBRN-specific training or operations. For Soldiers to wear the CBRN brassard, they must be operationally engaged in a mission that requires them to currently provide CBRN technical expertise within or outside the continental United States or to be immediately on call to provide the expertise.

Commanders may retain flexibility. For example, the CBRN brassard may be worn for local ceremonies when appropriate.

Endnote:

[1]DA Pam 670-1, *Guide to the Wear and Appearance of Army Uniforms and Insignia*, 10 April 2015.

The Need to Transition: Passive Defense to All-Hazards Response

By Captain Taylor S. Harrington

The Chemical Corps is often viewed as a dying branch of the U.S. Army—one that has served its purpose and is scrapping to stay alive. And from the outside looking in, it might be hard to argue the point. However, that perception can be attributed to a lack of knowledge about the capabilities provided by chemical, biological, radiological, and nuclear (CBRN) companies. This article focuses on how the Chemical Corps could shift its mission set from passive defense to all-hazards response with areas of interest that include military doctrine and training, the operational gap, and ground requirements.

The Chemical Corps is a branch that takes pride in its technical nature; however, we limit the capabilities that we can provide to commanders by remaining focused on operational decontamination, thorough decontamination, and mass casualty decontamination. By changing our mission to become a technical force, we can provide maneuver commanders with an additional resource with which to effect change throughout an operational environment. As a technical force, we must be able to conduct hasty sampling, effectively identify toxic industrial chemicals and materials, and exploit narcotics and clandestine laboratories. This approach must be learned at the institutional level and then filtered to the operational command by competent and qualified leaders at all levels.

"By changing our mission to become a technical force, we can provide maneuver commanders with an additional resource with which to effect change throughout an operational environment."

Our current doctrine, which focuses on CBRN defense, identifies three core fundamentals—contamination avoidance, protection, and decontamination. But these functions are performed within every maneuver battalion, thereby diminishing the need for the Chemical Corps to provide support to the battalions. We must realize, though, that our enemies have new capabilities. They may not have access to conventional CBRN weapons; rather, they are capable of using hazmat and hazardous waste to inflict mass casualties. Therefore, as a corps, we must move past Soviet-era tactics and provide maneuver commanders with better situational awareness by supplying them with timely and accurate information so that they can make informed decisions regarding the operational environment.

A knowledge baseline is established at the institution so that trained Soldiers can provide the operational domain with the most current doctrine, tactics, techniques, procedures, and equipment. However, because the institution consistently lags years behind the operational domain, there is a gap between institutional knowledge and the operational domain. This is a source of conflict for Soldiers because, although they learn what is being taught at the institution, that information is no longer required at the operational level. Therefore, operational tactics should be integrated into institutional learning so that Soldiers can provide maneuver commanders with current information and recommendations regarding combat threats on the battlefield.

As we progress into a new era, we must make sure that doctrine keeps pace with operational requirements. The Chemical Corps is a technical force that needs to provide commanders with technical capabilities (conducting hasty sampling, identifying toxic industrial chemicals and materials, exploiting narcotics and clandestine laboratories) and timely and accurate information to effect changes on the battlefield.

Captain Harrington is a platoon mentor with Company C, 3d Battalion, 11th Infantry Regiment (Officer Candidate School), Fort Benning, Georgia. He holds a bachelor's degree in emergency management from Jacksonville State University, Jacksonville, Alabama.

Incorporating CBRN Awareness Into Unit Training

By Captain Melissa A. Moorehouse

Many of us have heard the acronym *NBC* defined as *no body cares* at least once or twice—probably even from a battalion or brigade commander. When commanders get the call to prepare for war, they are faced with many tough decisions, some of which involve the prioritization of training. Because there is insufficient time to train on everything, commanders must identify which training will be the most beneficial in providing lifesaving information and techniques. Most commanders do not include chemical, biological, radiological, and nuclear (CBRN) training; but do not be discouraged. Instead, look for ways to incorporate CBRN awareness into other unit training.

Identify sections within the unit, and determine how CBRN events relate to the missions of those sections. Begin with the intelligence section (S-2). Provide a threat brief. Many leaders are unaware that Soldiers are affected by threat factors that are less overt than a sarin gas attack or nerve agent contamination and that CBRN training does not always include mission-oriented protective posture gear and decontamination lines. Build awareness concerning water and food supply contamination, biological infections, and common irritants that spread through touch. In addition, many commanders may not be familiar with the terms *toxic industrial chemicals* or *toxic industrial material*. The unit should be educated about how today's aggressors use toxic industrial chemicals and toxic industrial material more often than they use Cold War chemical warfare agents.

Units training for operations in an urban environment will likely receive room clearance training. During this training, set up a makeshift laboratory and observe the reactions of the Soldiers. Their observations and descriptions may be of value to the intelligence community and to those called upon to respond to and exploit a similar scene. Tracking the movements of toxic industrial chemicals, toxic industrial material, and homemade explosive materials may be an essential part of establishing civil security during stability operations.

Logistics convoys often train on what to do when encountering unexploded ordnance along their routes. Take this opportunity to introduce units to different types of chemical ordnance and other hazards.

Medics will likely receive training on ambulance exchange points. It is important that they maintain clean vehicles and routes and avoid introducing contaminants into the aid station. To maintain the integrity of medical treatment facilities, casualties must be decontaminated as far forward as possible. Ensure that medics consider decontamination procedures before transport. They should know how to use the unit detection equipment.

Reconnaissance teams often encounter weapons caches. They need to understand that, once the cache has been opened, the physical properties of the area change. If chemicals are involved, this can prove to be a life-or-death situation for troops on the ground. Therefore, the reconnaissance teams must be able to recognize the various weapon markings. Once they understand the threat, they will likely want to know how they can protect themselves and the cache that they have discovered.

These are a few examples of how CBRN awareness could be incorporated into unit training. CBRN instruction can be made to be so much more than the tired, passive defensive measures that have traditionally been taught in response to Cold War threats. However, it is up to Military Occupational Specialty 74D (CBRN specialist) and 74A (CBRN officer) Soldiers to determine innovative ways to meld modern CBRN training with the essential tasks associated with offensive, defensive, and stability operations. Once the areas that are most susceptible to CBRN threats are identified, the incorporation of CBRN training is often easier than expected. Building an awareness of less significant threat factors may lead to universal interest in CBRN training. Eventually, updates that incorporate CBRN training may even be made to Soldier Training Publication (STP) 21-24-SMCT, *Soldier's Manual of Common Tasks: Warrior Leader Skills, Level 2, 3, and 4*.

References:

FM 3-11.9, *Potential Military Chemical/Biological Agents and Compounds,* 10 January 2005.

STP 21-24-SMCT, *Soldier's Manual of Common Tasks: Warrior Leader Skills, Level 2, 3, and 4*, 9 September 2008.

Training Circular (TC) 3-10, *Commander's Tactical NBC Handbook,* 29 September 1994.

At the time this article was written, Captain Moorehouse was a student in the CBRN Captain's Career Course at Fort Leonard Wood, Missouri. She is now a chemical, biological, radiological, nuclear, and explosives response team leader with the 68th Chemical Company (Technical Escort), Aberdeen Proving Ground, Maryland. She holds a bachelor's degree in biology from Boston College, Chestnut Hill, Massachusetts, and a master's degree in emergency and disaster management from the American Military University.

UNIFORMS AND INSIGNIA OF CHEMICAL WARFARE SERVICE PROCUREMENT DISTRICT INSPECTORS, 1942–1945

By Mr. Kip A. Lindberg

Beginning in 1924, the Chemical Warfare Service (CWS) operated five U.S. procurement districts (Boston, New York, Pittsburg, Chicago, and San Francisco), where contracts were awarded for the production of chemical warfare materiel. Following America's entry into World War II and an increased need for chemical warfare materiel such as detection kits, gas masks, mortar shells, incendiary bombs, and decontamination equipment, two additional procurement districts (Atlanta and Dallas) were created.

One of the duties of the procurement district offices was to conduct quality control inspections at factories and depots. Most of the civilians who were hired to conduct these inspections were female; in fact, the CWS visited college campuses specifically to recruit women who were interested in its inspection apprenticeship program. During training, the apprentices received instruction in the areas of chemistry, basic metallurgy, the use of measuring instruments and gauges, and other miscellaneous subjects.

Figure 1: A CWS inspector from the Boston procurement district performs an inspection.

While no printed uniform regulation has been discovered, photographs of CWS inspectors indicate that they wore different types of dress, ranging from civilian clothing to various forms of uniforms. Inspectors in four districts (Boston, Pittsburg, San Francisco, and Dallas) appear to have adopted uniforms that differed in type but usually incorporated the crossed retorts and benzene ring that served as the branch insignia of the CWS.

Figure 1 shows a CWS inspector from the Boston procurement district wearing nonregulation "C.W.S." metal collar devices and a scroll embroidered with "CHEMICAL WARFARE SERVICE" on the left shoulder. A separate patch, underneath the scroll, is embroidered with "BOSTON." Although the U.S. Army Chemical Corps Museum has no sample from which to establish construction material or colors, it is supposed that the scroll and patch were made of cobalt blue material and embroidered with golden yellow thread—given that those were the branch colors.

Figure 2 shows CWS inspectors from the Pittsburg procurement district wearing regulation "U.S." and CWS officer branch devices on their collar points. They are also wearing a patch of red felt, with gauze backing, on the left shoulder. The patch is embroidered with yellow crossed retorts, a blue benzene ring, and the black letters of "C.W.S." However, it is unclear whether all CWS inspectors from the Pittsburg procurement district wore this particular uniform. Information accompanying the photograph in Figure 2, which was taken at the Goodyear Tire and Rubber Company in Akron, Ohio, (where gas masks were produced) indicates that this was the uniform which was adopted "for the duration," but that may have applied specifically to the inspectors at the Goodyear factory.

The uniforms worn by the CWS inspectors of the San Francisco procurement district are shown in Figures 3 and 4. There are no shoulder patches visible on the uniforms; but although the placement varies, the officer branch insignia is present on all of them. In one case, the "U.S." device is also displayed.

Several CWS inspectors from the Dallas procurement district are shown, apparently at a factory in Austin, in

Figure 2: CWS inspectors from the Pittsburg procurement district pose for a photograph.

Figure 3: CWS inspectors from the San Francisco procurement district perform an inspection.

Figure 5, page 38. Their lack of uniformity is apparent. Three of the six inspectors are wearing regulation CWS officer branch devices on their collars, although the placement varies (with one even appearing to be upside down). Four of the six are wearing a circular patch on the left shoulder. The patch contains an outer ring embroidered with "INSPECTION" and "CHEMICAL WARFARE SERVICE." The center consists of a two-color CWS branch insignia with "DALLAS" embroidered above it and "OFFICE" below it. CWS inspectors from the Dallas procurement district who performed inspections at the Hardwicke-Etter Hardware Company (manufacturers of 4.2-inch mortar shells), Sherman, Texas, wore white blouses with a federal shield-shaped patch on the left shoulder (Figure 6, page 38). The patch was embroidered with "CWS INSPECTOR." Again, although the Chemical Corps Museum has no sample from which to establish construction material or colors, it is supposed that the patch was made of blue material and embroidered with yellow thread.

The Chemical Corps Museum collection does not include any CWS inspector clothing; however, several observations can be made through the examination of historical photographs. The coats were typical of women's fashion, with buttons on the left and button holes on the right (opposite that of men's coats). Some coats had epaulettes; some did not. For those with epaulettes, the epaulettes were most commonly sewn onto the coat at the collar, extending to a point

Figure 4: A CWS inspector from the San Francisco procurement district poses for a photograph.

Figure 5: CWS inspectors from the Dallas procurement district pose for a photograph.

at the shoulder, where they were buttoned. In only one case were the epaulettes sewn into the shoulder seam, extending to the collar, where they were buttoned like men's uniform coats. Apparently, both skirts and pants were worn. Blouses were most commonly white. Neckties were not worn. There are no photographs that depict the CWS inspectors from the Dallas procurement district wearing jackets. Based on button placement, two or three of the photographed inspectors appear to be wearing men's shirts.

The collection at the Chemical Corps Museum, Fort Leonard Wood, Missouri, instills in our Soldiers an appreciation of the heritage of our branch and fosters esprit de corps. The museum welcomes information, photographs, and patches that anyone is willing to share.

Mr. Lindberg is the director of the Chemical Corps Museum.

Figure 6: CWS inspectors from the Dallas procurement district perform inspections at the Hardwicke-Etter Hardware Company.

CATS Update

The table below lists the combined arms training strategies (CATSs) for which the Collective Training Division, Directorate of Training and Leader Development, U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS), is responsible.

Unit Title	TOE/TDA Number	Date Published to DTMS
CBRNE Operational Headquarters	37800R000	2 April 2015
Nuclear Disablement Team	37507R000	23 March 2015
WMD Coordination Element	37517R100	23 March 2015
CBRN Brigade	03492R000	30 March 2015
CBRN Battalion	03496R000	23 March 2015
CBRNE Battalion (Technical Escort)	03636R000	23 March 2015
CBRN Company (Area Support)	03420R300	23 March 2015
CBRN Company (Biological)	03470R000	31 March 2015
CBRN Company (Maneuver Support)	03410R000	31 March 2015
CBRN Company (Obscuration)	03440R100	23 March 2015
CBRN Coordination Element	03579RA00	3 April 2015
CBRN Reconnaissance Detachment	03529R000	31 March 2015
CBRNE Company (Technical Escort)	03530R000	23 March 2015
WMD–Civil Support Team	300627-35	23 March 2015

Legend:

CBRN—chemical, biological, radiological, and nuclear
CBRNE—chemical, biological, radiological, nuclear, and explosives
DTMS—Digital Training Management System
TDA—table of distribution and allowances
TOE—table of organization and equipment
WMD—weapons of mass destruction

Note: CATSs are reviewed and updated on an annual basis to ensure that they include unit input and remain current.

DOCTRINE UPDATE

U.S. Army Maneuver Support Center of Excellence
Capabilities Development Integration Directorate
Concepts, Organization, and Doctrine Development Division

Number	Title	Date	Status
Joint Publications			
The U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS) is not the proponent for joint publications (JPs). However, the Chemical, Biological, Radiological, and Nuclear (CBRN) Doctrine Branch; Concepts, Organization, and Doctrine Development Division; Capabilities Development Integration Directorate; U.S. Army Maneuver Support Center of Excellence, is often a key stakeholder and sometimes the lead agent for a JP. Five JPs affect the development or revision of tactical-level CBRN publications.			
JP 3-11	*Operations in Chemical, Biological, Radiological, and Nuclear (CBRN) Environments*	4 Oct 13	Current.
JP 3-11 is no longer focused purely on passive defense, which is based on a new definition of the CBRN environment as "an operational environment that includes CBRN threats and hazards and their potential resulting effects." Rather than dwelling on postevent hazards that require reactions, the focus is on preevent threats and hazards that allow proactive measures. JP 3-11 also includes information about the new, validated, approved concepts of hazard awareness and understanding and contamination mitigation.			
JP 3-27	*Homeland Defense*	29 Jul 13	Current.
JP 3-27 provides information across the range of military operations (including interorganizational coordination, planning, and mission command) that is required to defeat external threats to, and aggression against, the homeland—or other threats, as directed by the President. The scope of the current revision has been narrowed by replacing the phrase *defense of the U.S. homeland* with *homeland defense*. Presidential and Secretary of Defense guidance has evolved significantly since 2007, thereby affecting relationships between the federal government and state and local jurisdictions with regard to unified action. JP 3-27 covers the federal and state interagency coordination of roles that are unique to homeland defense and then refers to JP 3-08, *Interorganizational Coordination During Joint Operations*, for more detailed guidance. JP 3-27 also addresses the dual roles of the Army National Guard in federal and state chains of command and explains how those roles affect homeland defense.			
JP 3-28	*Civil Support*	31 Jul 13	Current.
JP 3-28 provides overarching guidelines and principles to assist commanders and staffs in planning, conducting, and assessing defense support of civil authorities (DSCA). It introduces the principle of civilian agencies being in charge of the domestic operations that receive military support. It also discusses the unique command relationships and coordinating processes to be used when operating in DSCA capacity. Finally, JP 3-28 discusses selected aspects of supporting and sustaining the joint force during these specific types of operations. Major changes from the previous version include replacing the term *civil support* with the term *DSCA* and replacing the term *National Response Plan* with the term *National Response Framework*.			
JP 3-40	*Countering Weapons of Mass Destruction*	31 Oct 14	Current.
The JP 3-40 revision effort was synchronized with that of the *Department of Defense Strategy for Countering Weapons of Mass Destruction*.[1] Major changes include replacing the term *combating weapons of mass destruction (WMD)* (struggling with or fighting) with the term *countering WMD* (embarking on efforts to counterproliferate the development, use, and means of delivery, including efforts to minimize or negate the effects of an event). This is important, as the CBRN community has struggled to acquire a common lexicon since combating/countering WMD rose to the forefront of national concern. The focus of the framework is no longer on the eight military mission areas, but rather on a series of strategic approaches.[2] Sections describing the Countering Terrorism Campaign and explaining how countering WMD relates to DSCA have also been added. This is a significant addition since combating/countering WMD considerations for the continental United States have not previously been incorporated. JP 3-40 continues to focus on "left of boom" (dissuade, deter, disrupt) proactive measures.			
JP 3-41	*Chemical, Biological, Radiological, and Nuclear Consequence Management*	21 Jun 12	Current.
JP 3-41 now focuses only on CBRN. It includes a new framework for CBRN response, elevates consequence management to a federal government level of effort, and aligns joint doctrine with the Department of Defense (DOD) contribution to consequence management. This publication introduces three subsets of consequence management (domestic CBRN, foreign, and DOD-led) and discusses the roles and responsibilities of the subsets and the differences between them. JP 3-41 also introduces the DOD chemical, biological, radiological, and nuclear response enterprise (CRE), an integrated Regular Army and Reserve Component approach to CBRN response. When directed by the Secretary of Defense and the state governor, the DOD CRE conducts CBRN response operations in support of civil authorities responding to CBRN incidents within the United States and its territories to save lives and minimize human suffering.[3, 4]			
Multi-Service Publications			
The USACBRNS is the U.S. Army proponent and lead agent for eight tactical-level, multi-Service publications. Seven of the publications are sponsored by the Joint Requirements Office for CBRN Defense (J-8), Joint Chiefs of Staff.			
FM 3-11 MCWP 3-37.1 NWP 3-11 AFTTP 3-2.42	*Multi-Service Doctrine for Chemical, Biological, Radiological, and Nuclear Operations*	1 Jul 11	Current. Will be revised in the near future due to the publishing of the *Department of Defense Strategy for Countering Weapons of Mass Destruction* and the Army's white paper on "Countering Weapons of Mass Destruction." The revision timeline will be based on guidance from the Joint Requirements Office and a decision from all four Services.
Field Manual (FM) 3-11 is the only field manual for which the USACBRNS is the lead agent. It focuses on combating WMD, discusses the strategic pillars and tactical objectives, and translates the military mission areas into eight tactical tasks. This represents a huge paradigm shift for the CBRN community. Our focus moves toward the more proactive role of conducting or supporting active defense, interdiction operations, offensive operations, and elimination operations and away from the reactive role of passive defense (including avoidance, protection, and decontamination).			

Number	Title	Date	Status
ATP 3-11.23 MCWP 3-37.7 NTTP 3-11.35 AFTTP 3-2.71	*Multi-Service Tactics, Techniques, and Procedures for Weapons of Mass Destruction Elimination Operations*	1 Nov 13	Current.
Army Techniques Publication (ATP) 3-11.23 is "Part 2" of ATP 3-11.37. The WMD–elimination isolation activity is the seam that links the battle handover from a conventional CBRN force conducting the assessment task to the technical CBRN force conducting exploitation and destruction tasks. ATP 3-11.23 educates the reader on performing the entire process from cradle (reconnoitering) to grave (monitoring and redirecting) and on planning, preparing, executing, performing, and assessing considerations throughout. This tactical-level publication truly focuses on "left of boom" actions.			
ATP 3-11.32 MCWP 3-37.2 NTTP 3-11.37 AFTTP 3-2.46 (Volumes I and II)	*Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Passive Defense*	TBD	Under development. Will combine, revise, and supersede FM 3-11.3, FM 3-11.4, and FM 3-11.5. Will be published 3d quarter, fiscal year (FY) 2015.
ATP 3-11.32 will consist of two volumes. Volume I will contain information for conducting operations; performing tactics, techniques, and procedures (TTP); and understanding how to carry out CBRN passive defense. Volume II will contain supporting technical information (CBRN Warning and Reporting System, hazard prediction, decontamination). ATP 3-11.32 will contain the latest validated information regarding hazard prediction and warning and reporting procedures. It will present tactical-level discussions on the validated joint concept of contamination mitigation, which will be introduced in the revised JP 3-11.			
ATP 3-11.36 MCRP 3-37B NTTP 3-11.34 AFTTP 3-2.70	*Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Aspects of Command and Control*	1 Nov 13	Current.
ATP 3-11.36 includes the doctrinal employment of CBRN capabilities (organizations, personnel, technology, and information) to characterize CBRN threats and hazards, including toxic industrial material, for the commander and the force. This manual also incorporates the joint doctrine elements for combating WMD. It is designed to provide operational- and tactical-level commanders and staffs with capability employment planning data and considerations to shape military operations involving CBRN threats and hazards and operations in CBRN environments.			
ATP 3-11.37 MCWP 3-37.4 NTTP 3-11.29 AFTTP 3-2.44	*Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Reconnaissance and Surveillance*	25 Mar 13	Current.
ATP 3-11.37 is designed for the conventional force. It establishes forms, modes, and methods of (and tasks for) CBRN reconnaissance and surveillance. It also establishes four new CBRN hazard identification levels that have been accepted by combatant commanders and the medical community for environmental samples and clinical specimens. These new hazard identification levels allow the conventional force to provide the commander with sample identification at higher levels of confidence. This, in turn, allows the commander to make more timely, higher-level decisions that enhance force protection, improve mission accomplishment, and result in resource savings. It establishes a sample management process and educates Soldiers on the protocols of the process, from sample collection through transfer. Finally, it instructs Soldiers on dismounted reconnaissance operations in urban environments.			
FM 3-11.21 MCRP 3-37.2C NTTP 3-11.24 AFTTP(I) 3-2.37	*Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Consequence Management Operations*	1 Apr 08	Under revision. Will be redesignated ATP 3-11.41. Will be published 1st quarter, FY 16.
ATP 3-11.41 will focus on DOD support to domestic or foreign CBRN consequence management operations. It will be designed for CBRN responders who plan and conduct CBRN consequence management operations in domestic, foreign, or theater operational environments. It will provide an important reference for planning and conducting CBRN consequence management.			
ATP 3-11.46 AFTTP 3-2.81	*Weapons of Mass Destruction–Civil Support Team Operations*	20 May 14	Current.
ATP 3-11.46 serves as the foundation for WMD–civil support team (CST) doctrine. It focuses on the organization, mission, command and control (C2), and operations of WMD-CSTs, which are full-time Army National Guard units designed to provide the specialized capability necessary to respond to intentional and unintentional incidents and natural and man-made disasters. The WMD-CST, a component of the CRE, provides direct support to local, tribal, state, and federal emergency responders, including fire, police, and emergency medical service personnel. Unless federalized under Title 10, U.S. Code (10 USC), *Armed Forces*, WMD-CSTs operate in 32 USC, *National Guard*, status within the United States and its territories and possessions. Responding under the authority of the state governor, WMD-CSTs assist agencies that may be overwhelmed or may require specific technical capabilities which are not otherwise readily available.			
ATP 3-11.47 AFTTP 3-2.79	*Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Enhanced Response Force Package (CERFP) and Homeland Response Force (HRF) Operations*	26 Apr 13	Current.

Number	Title	Date	Status
ATP 3-11.47 is a new manual. It contains detailed tactical doctrine and TTP and sets the foundation for the tactical employment of the chemical, biological, radiological, nuclear, and explosives enhanced response force package (CERFP) and homeland response force (HRF). The CERFP and HRF can be pre-positioned, or they can respond to an incident using existing organic transportation and Army National Guard/Air National Guard units that are in 32 USC status. These units are trained and equipped to integrate under the National Incident Management System in support of an incident commander. The CERFP supports the incident commander by planning and exercising mission command, casualty search and extraction, ambulatory and nonambulatory mass casualty decontamination, emergency medical triage and patient stabilization, and fatality search and recovery. The HRF supports the incident commander by planning and conducting C2, security operations and, if applicable, CERFP operations.			
Army-Only Publications			
The USACBRNS is the U.S. Army proponent for four tactical-level, Army-only publications.			
ATP 3-11.24	*Technical Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives (CBRNE) Force Employment*	6 May 14	Current.
ATP 3-11.24 describes how technical chemical, biological, radiological, nuclear, and explosives (CBRNE) forces support combatant commanders through every phase of operations conducted in-theater and in the homeland. This is important in educating those who are outside the CBRN community with regard to the true capabilities of the technical CBRNE force. The appendixes include information about specific technical CBRNE force missions, organizations, capabilities, and employment considerations.			
ATP 3-11.50	*Battlefield Obscuration*	15 May 14	Current.
ATP 3-11.50 provides TTP to plan obscuration operations and employ obscurants during, or in support of, unified land military operations at the tactical through operational levels of war.			
ATP 3-37.11	*Chemical, Biological, Radiological, Nuclear, and Explosives Task Force Operations*	TBD	Under development.
ATP 3-37.11 will inform those who employ CBRNE task forces about their mission, organization, key tasks, and capabilities across the countering WMD tactical tasks (conduct WMD security cooperation and partner activities, conduct WMD threat reduction cooperation, conduct WMD interdiction, conduct WMD offensive operations, conduct WMD elimination, conduct WMD active defense, conduct CBRNE passive defense, and conduct CBRNE consequence management) during operations in support of joint and combatant commands. It will provide guidance on the employment of CBRNE task forces across the range of military operations.			
FMI 3-90.10	*Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Operational Headquarters*	24 Jan 08	In accordance with the Army reengineering effort of 2015, this publication will be rescinded in December 2015.
FMI 3-90.10 educates the reader on the special capabilities that exist within the CBRNE mission command element.			
Technical Manuals			
The USACBRNS is the proponent and approving authority for two technical manuals.			
TM 3-11.42 MCWP 3-38.1 NTTP 3-11.36 AFTTP 3-2.82	*Multi-Service Tactics, Techniques, and Procedures for Installation Emergency Management*	23 Jun 14	Current.
Technical manual (TM) 3-11.42 addresses the installation commander's response to an incident that takes place on an installation. The scope of this revision has been expanded from CBRN defense to all-hazards installation emergency management, which includes the management of CBRN events. The publication defines the roles of DOD installation commanders and staffs and provides the TTP associated with installation planning and preparedness for, response to, and recovery from all hazards in order to save lives, protect property, and sustain mission readiness.			
TM 3-11.91 MCRP 3-37.1B NTRP 3-11.32 AFTTP 3-2.55	*Chemical, Biological, Radiological, and Nuclear Threats and Hazards*	TBD	Under development. Will revise and supersede FM 3-11.9 and FM 3-11.11. Will be published 3d quarter, FY 15.
TM 3-11.91 serves as a one-stop shop for information about the technical aspects of CBRN threats and hazards, including information about the chemistry of homemade explosives. In addition to the technical information on CBRN threats and hazards, it also includes basic educational information and covers the "so what" and the field behavior of CBRN hazards (including riot control agents and herbicides). The appendixes contain scientific CBRN data, and the centerpiece of the manual is the CBRN threats and hazards diagram.			

[1]The *Department of Defense Strategy for Countering Weapons of Mass Destruction,* June 2014*,* replaces the *National Military Strategy to Combat Weapons of Mass Destruction*, 13 February 2006.

[2]The eight military mission areas are offensive operations, elimination operations, interdiction operations, active defense, passive defense, WMD consequence management, security cooperation and partnership activities, and threat reduction cooperation. (See FM 3-11.)

[3]The Secretary of Defense authorizes DSCA support by federal military forces (defense chemical, biological, radiological, and nuclear response force [DCRF] and command and control chemical, biological, radiological, and nuclear response element [C2CRE] A and C2CRE B).

[4]The state governor authorizes DSCA by Army National Guard forces under state mission command (WMD-CST, CERFP, and HRF).

Professional Military Education

Qualification training courses are listed and described in Table 1.

Table 1. Qualification training courses

Enlisted/Noncommissioned Officer (NCO) Qualification Training Courses	
74D10 Chemical, Biological, Radiological, and Nuclear (CBRN) Specialist Course (School Code 031)	
Phase I (Course 031-74D10 [R] [dL])	Once Soldiers are enrolled in Phase I, they will receive e-mail instructions from the Army Distributed Learning Program via Army Knowledge Online (AKO). Students must complete Phase I before reporting for Phase II training. An Army Correspondence Course Program (ACCP) certificate of completion (e-mailed) or other documentation must be presented as proof of Phase I completion during Phase II in-processing. Soldiers who experience problems with Phase I should telephone the ACCP at (800) 275-2872 (Option 3) or (757) 878-3322/3335. If no ACCP representative is available, they should contact Ms. Meredith Jansen at (573) 563-7164 or <meredith.a.jansen.civ@mail.mil>.
74D10 CBRN Specialist Course (School Code R031)	
Phases II and III (Course 031-74D10 [R1])	These phases consist of resident training conducted at Fort Leonard Wood, Missouri. Soldiers must have an e-mail printout indicating that they have completed Phase I. Soldiers who fail to provide the printout are returned to their units.
CBRN Transition Course (School Code R031)	
This is a three-phase resident course. Soldiers attending the CBRN Transition Course (031-74D2/3/4) must be graduates of a military occupational specialty (MOS) Advanced Leader Course (ALC) or Basic Noncommissioned Officer Course (BNCOC). Soldiers who have not attended ALC or BNCOC must attend the CBRN Specialist Course (031-74D10) to become 74D10 MOS-qualified. Soldiers must complete the online Hazmat Awareness Training at <https://afcesa.csd.disa.mil/kc/login/login.asp> prior to attending the CBRN Transition Course; certificates must be presented during in-processing.	
74D30 CBRN ALC (School Code R031, Course 031-74D30-C45)	
CBRN ALC is a three-phase resident course. Phase I is waived for Soldiers who possess a certificate indicating that they have completed Department of Defense (DOD)-certified hazmat training at the technician level. Effective 1 October 2014, graduation from Structured Self-Development, Level II, is a prerequisite for attending CBRN ALC.	
74D40 Senior Leader Course (SLC) (School Code R031, Course 031-74D30-C46)	
This is a three-phase resident course conducted at Fort Leonard Wood. Graduation from Structured Self-Development, Level III, is a prerequisite for attending SLC.	
Officer Qualification Training Courses	
CBRN Captain's Career Course (C3) (School Code 031)	
Phase I (Course 4-3-C23 [dL])	This branch-specific distributed learning (dL) phase consists of 108 hours of dL instruction, which must be completed within 60 days before attending Phase II. Unit trainers enroll Soldiers through the Army Training Requirements System (ATTRS). Students receive e-mail instructions from the Army Distributed Learning Program. Hazmat awareness training can be accessed at <https://afcesa.csd.disa.mil/kc/login/login.asp> and completed by students prior to attending Phase II. Students who encounter problems should contact the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS) U.S. Army Reserve (USAR) Training Development NCO, Sergeant First Class Larry Foreman, at (573) 563-7757 or <larry.d.foreman.mil@mail.mil>. The successful completion of Phase I (and the CBRN Defense Course [branch transfers]) is a prerequisite for Phase II attendance.
Phase II (Course 4-3-C23)	This branch-specific resident phase consists of 2 weeks of training conducted at USACBRNS. The focus is on radiological operations, live-agent training, hazmat awareness and operations level training and certification, and the basics of the Joint Warning and Reporting Network used within the Maneuver Control System. The successful completion of Phase II is a prerequisite for enrollment in Phase III.
Phase III (Course 4-3-C23 [dL])	This common-core (CC) phase consists of 59.2 hours of dL instruction. Unit trainers enroll Soldiers through ATTRS. Students receive e-mail instructions from the Army Distributed Learning Program. Students must complete Phase III within 60 days of attending Phase IV. Those who encounter problems should contact Sergeant First Class Foreman at (573) 563-7757 or <larry.d.foreman.mil@mail.mil>. The successful completion of Phase III is a prerequisite for Phase IV attendance.
Phase IV (Course 4-3-C23)	This resident phase consists of 2 weeks of training conducted at USACBRNS. The focus is on a computer-aided exercise that includes additional Joint Warning and Reporting Network and Maneuver Control System training, culminating in a military decisionmaking process exercise using state-of-the-art battle simulation equipment.

Joint SLC (Course 4K-74A/494-F18)
This is a 4-day course for senior leaders focusing on operational- and strategic-level aspects of countering weapons of mass destruction (WMD). Participants also receive toxic-agent training at the Chemical Defense Training Facility. In addition, the Joint SLC forum offers a unique opportunity for senior military leaders, civilian government agency leaders, and leaders representing allied and coalition partners to exchange ideas.
CBRN Precommand Course (Course 4K0F4)
This is a 5-day course that prepares Regular Army and Reserve Component (RC) officers who have been selected for command of a CBRN battalion or brigade or a CBRN position in a division. Each student receives instruction in the application of Army Doctrine Publication (ADP) 7-0, *Training Units and Developing Leaders*, concepts to the battalion training management process.
Note: Additional information is available at <https://www.atrrs.army.mil/>.

The courses shown in Table 2 are required by command and control chemical, biological, radiological, and nuclear response element (C2CRE); chemical, biological, radiological, nuclear, and explosives enhanced response force package (CERFP); WMD–civil support team (CST); domestic response force; and homeland response force units for MOS qualification.

Table 2. Functional training courses

Mass Casualty Decontamination Course (School Code 031, Course 4K-F25/494-F-30)
This 9-day course is appropriate for CERFP and domestic-response casualty decontamination team members. Students who successfully complete the course receive certification at the hazmat awareness and operations levels.
CBRN Responder Course (School Code 031, Course 4K-F24/494-F29)
This 10-day course is appropriate for C2CRE members. All students attending the course must be International Fire Service Accreditation Congress (IFSAC) DOD awareness-certified before arriving. Students who successfully complete the course receive certification at the hazmat operations and technician levels.
Civil Support Skills Course (CSSC) (School Code 031, Course 4K-F20/494-28)
This 8-week course is appropriate for Army National Guard WMD-CST members. Students receive advanced training in hazmat technician and incident command and CBRN survey, point reconnaissance, sampling operations, personal protective equipment selection and certification, and decontamination. They also receive specialized training on a variety of military and commercial CBRN detection equipment.
Note: All students who successfully complete hazmat training are awarded certificates issued by IFSAC and DOD. Additional copies of certificates can be obtained at <http://www.dodffcert.com>.

A Soldier who arrives for any resident course without having first completed all appropriate dL requirements will be returned to his or her unit without action.

USACBRNS RC Personnel

Officers (O-3 through O-5) and NCOs (E-7 through E-9) who are interested in available drilling individual mobilization augmentee positions throughout USACBRNS should contact the USAR Proponency NCO.

Field grade USAR officers who would like to transfer into the Chemical Corps should contact the USACBRNS Deputy Assistant Commandant–Army Reserve (DAC-AR) for specific branch qualification information.

The 3d Brigade (Chemical), 102d Division (Maneuver Support), is currently seeking instructors for various locations. An applicant should be an E-6 or E-7, should be qualified (or able to be trained) as an Army basic instructor, and should have completed the appropriate NCO Education System coursework. Interested Soldiers should contact Sergeant First Class Matthew Fries at (860) 570-7106 or <matthew.j.fries4.mil@mail.mil>.

Contact Information

Colonel Francisco S. Velez (DAC-AR), (573) 563-8050 or <francisco.s.velez.mil@mail.mil>.

Sergeant Major Phillip D. Pennington (CBRN USAR Sergeant Major), (573) 563-4026 or <phillip.d.pennington2.mil@mail.mil>.

Sergeant First Class Larry D. Foreman (Training Development NCO–AR), (573) 563-7757 or <larry.d.foreman.mil@mail.mil>.

Lieutenant Colonel Kenneth R. Napier (DAC-NG), (573) 563-7676 or <kenneth.r.napier.mil@mail.mil>.

Master Sergeant Christopher C. Lemley (Proponency NCO–NG), (573) 563-7667 or <christopher.c.lemley.mil@mail.mil>.

Reference:

ADP 7-0, *Training Units and Developing Leaders*, 23 August 2012.

Chief of Chemical's Recommended Professional Reading List

By Brigadier General Maria R. Gervais

Three critical factors must be addressed in our continuing competence as Dragon Soldiers—institutional training, practical experience within units, and self-development. One of the key components of self-development is professional reading. It builds an independent basis of knowledge upon which to form opinions and make judgments. Professional reading continues to be vital as Soldiers maintain the initiative of today and prepare for an uncertain tomorrow.

I encourage you to read the following professional publications and reflect on how they may further your education and expertise:

- Graham Allison, *Nuclear Terrorism: The Ultimate Preventable Catastrophe*, Henry Holt and Company, LLC, New York, 2004, ISBN-13: 978-0-8050-7852-7.
- Kurt M. Campbell et al., *The Nuclear Tipping Point: Why States Reconsider Their Nuclear Choices*, Brookings Institution Press, 2004, ISBN-13: 978-0-8157-1330-2.
- Charles D. Ferguson and William C. Potter, *The Four Faces of Nuclear Terrorism*, Routledge, Taylor & Francis Group, New York, 2005, ISBN-13: 978-0-415-94244-1.
- Laurie Garrett, *The Coming Plague: Newly Emerging Diseases in a World Out of Balance*, the Penguin Group, New York, 1994, ISBN-13: 978-0-14-025091-6.
- Richard L. Garwin and Georges Charpak, *Megawatts + Megatons: The Future of Nuclear Power and Nuclear Weapons*, University of Chicago Press, Chicago, 2002, ISBN-13: 978-0-226-28427-9.
- Robert Harris and Jeremy Paxman, *A Higher Form of Killing: The Secret History of Chemical and Biological Warfare*, Random House Publishing Group, 18 December 2007, ISBN-13: 978-0-8129-6653-4.
- David E. Hoffman, *The Dead Hand: The Untold Story of the Cold War Arms Race and Its Dangerous Legacy*, Anchor Books, New York, 2009, ISBN-13: 978-0-307-38784-4.
- Gregory D. Koblentz, *Living Weapons: Biological Warfare and International Security*, Cornell University Press, Ithaca, 2009, ISBN-13: 978-0-8014-7752-2.
- William Langewiesche, *The Atomic Bazaar: The Rise of the Nuclear Poor*, Farrar, Straus, and Giroux, New York, 2007, ISBN-13: 978-0-374-10678-2.
- Judith Miller et al., *Germs: Biological Weapons and America's Secret War*, Touchstone, New York, 2002, ISBN-13: 978-0-684-87159-2.
- Michael B. A. Oldstone, *Viruses, Plagues, & History: Past, Present, and Future*, Oxford University Press, New York, 2010, ISBN-13: 978-0-19-532731-1.
- Richard Preston, *The Demon in the Freezer: A True Story*, Random House Publishing Group, 2002, ISBN-13: 978-00345-46663-1.
- Johnathan B. Tucker, editor, *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, the MIT Press, Cambridge, Massachusetts, 2000, ISBN-13: 978-0-262-79971-9.
- Johnathan B. Tucker, *War of Nerves: Chemical Warfare from World War I to Al-Qaeda*, Anchor Books, New York, 2006, ISBN-13: 978-1-4000-3233-4.

United States Army

Chemical Corps

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