

Army Chemical Review

The Professional Bulletin of the Chemical Corps

Summer 2017

HEADQUARTERS, DEPARTMENT OF THE ARMY
Approved for public release; distribution is unlimited.
PB 3-17-1

U.S. Army
Chemical, Biological, Radiological, and Nuclear School
(573) XXX-XXXX
DSN 676-XXXX (563 prefix) or 581-XXXX (596 prefix)

COMMANDANT
BG James E. Bonner **563-8053**
<james.e.bonner4.mil@mail.mil>

ASSISTANT COMMANDANT
COL Dale S. Crockett **563-8053**
<dale.s.crockett.mil@mail.mil>

CHIEF OF STAFF
MAJ Robert T. Paul **563-8052**
<robert.t.paul.mil@mail.mil>

REGIMENTAL COMMAND SERGEANT MAJOR
CSM Henney M. Hodgkins **563-6133**
<henney.m.hodgkins.mil@mail.mil>

REGIMENTAL CHIEF WARRANT OFFICER
CW2 Jesse S. Deberry **563-8051**
<jesse.s.deberry.mil@mail.mil>

DEPUTY ASSISTANT COMMANDANT
VACANT **563-8132**

DEPUTY ASSISTANT COMMANDANT– ARMY RESERVE
LTC(P) Leslie M. Dillard **563-8050**
<leslie.m.dillard.mil@mail.mil>

DEPUTY ASSISTANT COMMANDANT–NATIONAL GUARD
LTC Robert W. Mandell **563-7676**
<robert.w.mandell2.mil@mail.mil>

3D CHEMICAL BRIGADE
COL Darryl O. Hood **596-0016**
<darryl.o.hood.mil@mail.mil>

DIRECTORATE OF TRAINING AND LEADER DEVELOPMENT
COL Kent B. Soebbing **563-6531**
<kent.b.soebbing.mil@mail.mil>

PERSONNEL DEVELOPMENT OFFICE
MAJ Chadrick K. Walley **563-7374**
<chadrick.k.walley.mil@mail.mil>

CHIEF OF DOCTRINE
LTC Randy D. George **563-8189**
<randy.d.george.mil@mail.mil>

G-37 PUBLICATIONS
Managing Editor, Diana K. Dean **563-4137**
<diana.k.dean.civ@mail.mil>

Editor, Cheryl L. Green **563-5004**
<cheryl.l.green26.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>

Army Chemical Review (ACR) (ISSN 0899-7047) is published biannually in June and December by the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS), Fort Leonard Wood, Missouri. The *ACR* highlights unique Army chemical, biological, radiological, and nuclear technical-response capabilities for supporting national countering weapons of mass destruction operations and conducting all-hazmat mitigation across the range of military operations anytime, anywhere. The objectives of *ACR* are to inform, motivate, increase knowledge, improve performance, and provide a forum for the exchange of ideas. This publication presents professional information; but the views expressed herein are those of the authors, not the Department of Defense or its elements. The content does not necessarily reflect the official U.S. Army position and does not change or supersede any information in other U.S. Army publications. The use of news items constitutes neither affirmation of their accuracy nor product endorsement.

Articles to be considered for publication are due 15 February and 15 August. Send submissions by e-mail to <usarmy.leonardwood.mscoe.mbx.mdotacr@mail.mil>, or send an electronic copy in Microsoft® Word on a CD and a double-spaced copy of the manuscript to Army Chemical Review, 14010 MSCoE Loop, Building 3201, Suite 2661, Fort Leonard Wood, MO 65473-8702. Due to the limited space per issue, we normally do not print articles that have been published elsewhere.

Articles may be reprinted if credit is given to *ACR* and its authors. All photographs are official U.S. Army photographs unless otherwise noted. *ACR* reserves the right to edit material.

PERSONAL SUBSCRIPTIONS are available through the U.S. Government Printing Office, P.O. Box 979050, St. Louis, MO 63197-9000.

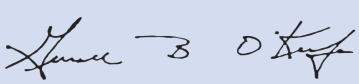
UNIT SUBSCRIPTIONS are available by e-mailing <us.army.leonardwood.mscoe.mbx.mdotacr@mail.mil> Please include the complete mailing address (including unit name, street address, and building number) and the number of copies per issue.

POSTMASTER: Send unit address changes to Army Chemical Review, 14010 MSCoE Loop, Building 3201, Suite 2661, Fort Leonard Wood, MO 65473-8702.

By Order of the Secretary of the Army:

MARK A. MILLEY
General, United States Army
Chief of Staff

Official:



GERALD B. O'KEEFE
Administrative Assistant to the
Secretary of the Army
1705901

Army Chemical Review

The Professional Bulletin of the Chemical Corps

PB 3-17-1, Summer 2017

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

5 **Regimental Command Sergeant Major**

7 **Regimental Chief Warrant Officer**

9 **Disciplined Disobedience: Army Chief of Staff Highlights Ethics of Command**
By Captain Jonathan L. Duran

11 **Examining the 20th CBRNE Command in 2016**
By Brigadier General William E. King IV

14 **ECBC Tests Chemical and Biological Sensor Integration in Utah Desert**
By Dr. Brian B. Feeney

16 **Your Unit Can Achieve CBRN Equipment Perfection**
By Mr. Angel S. Castro-Rodriguez, Dr. John R. Kennedy, Mr. Kyle R. Phillips, and Mr. Troy D. Thompson

19 **Lessons Learned From Battalion Command**
By Lieutenant Colonel Adam W. Hilburgh

22 **ECBC: 100 Years of Protecting the American Soldier**
By Dr. Brian B. Feeney

27 **Understanding Decontamination: Redox Reactions, Ad Hoc Decontamination, and Nanotechnology**
By Specialist Michael K. Forlife

29 **NATO Exercise CRNA GORA—2016**
By Lieutenant Colonel Jeremy J. DiGioia

32 **Dragon Civilians**
By Ms. Karen Jolley Nikol

34 **Book Review of *The Dead Hand: The Untold Story of the Cold War Arms Race and Its Dangerous Legacy***
Reviewed by Captain Heidi D. Beemer

37 **Reactivate 21st Chemical Company Airborne Status**
By Captain Eugene Ellis Jr. and First Lieutenant Trenton M. Gravely

38 **The Omaha MCD Concept**
By Captain Gerald W. Ratchford and Sergeant First Class John A. Beels

40 **Strategic Risk Management in the U.S. Army**
By Major LeRhonda J. A. Washington

42 **Homeland Operations: Army Warfighter Challenge No. 6**
By Mr. Tony W. Sexton

44 **Doctrine Discussions on milSuite**
By Mrs. Sharon M. McCann and Captain Bryan A. VanBuskirk

46 **USACBRNS CATS Update**

47 **Doctrine Update**

50 **Reserve Component Update**

52 **The Commandant's Reading Program**
Compiled by Lieutenant Colonel James P. Harwell

Editor's Note: Tuffs University was incorrectly identified as being located in Medford, Maine, on page 3 of the Winter 2016 issue of *Army Chemical Review*. Tufts University is located in Medford, Massachusetts.



Cover photographs: U.S. Army photos

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

As my first year as the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS) Commandant ends, I remain extremely honored to serve with such a highly motivated and technically sound group of chemical, biological, radiological, and nuclear (CBRN) Soldiers, commissioned officers, warrant officers, and noncommissioned officers.

I continue to work with Army CBRN organizations, joint partners across the Department of Defense, Allied partners, and private-industry representatives to facilitate and expedite state-of-the-art technologies and capabilities that are crucial to the growth of our Regiment and critical to the success of the joint warfighting community on and off the battlefield. During key leader engagements across the globe, I remain committed to articulating a clear vision on how we are transforming our Regiment and its capabilities for the better.

In the past 12 months, our Regiment has made great strides in all four of the Army training readiness pillars: manning, equipping, training, and leader development. The progress in addressing these broad and difficult pillars would not have been possible without the integration, collaboration, and synchronization undertaken with all of the countering weapons of mass destruction (CWMD) stakeholders across the community of interest.



Brigadier General James E. Bonner

In support of my synchronization efforts, the ongoing CWMD initiatives categorized by the doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P) functions are depicted by the following:

- **Doctrine.** Based on maneuver force feedback, a comprehensive maneuver doctrine manual for CWMD operations—Army Techniques Publication (ATP) 3-90.40, *Combined Arms Countering Weapons of Mass Destruction*—was required to address readiness; foster universal understanding on the roles and responsibilities of maneuver forces as the CWMD lead; and ensure common CWMD terms, associated combined arms training strategies (CATS), and CWMD training support packages.[1] The draft is out for worldwide staffing. We expect publication during the 3d quarter of fiscal year (FY) 2017. We leveraged the 2d Infantry Division (2ID) Micro Experiment of December 2016 to validate tasks and procedures outlined in the ATP. Along with publishing the ATP, a collaborative effort between collective training developers (predominantly from the U.S. Army Maneuver Center of Excellence, Fort Benning, Georgia, and USACBRNS) will provide CATS in support of unit training.
- **Organization.**
  - There is an ongoing effort in the Theater Special Operations Command, U.S. Special Operations Command, to increase the number of CWMD staff planners and the level of preparedness to support contingency and crisis response.
  - Readiness issues spawned recent and ongoing discussions for placing Military Occupational Specialty 74D CBRN Soldiers back into troop, battery, and company maneuver formations. This continues to be reviewed as an emerging growth option.
- **Training.**
  - In March, USACBRNS received the results of the September 2016 U.S. Army Training and Doctrine Command (TRADOC) accreditation. USACBRNS received a rating of "institution of excellence," which is the same rating received in 2013.
  - There is an increase in CWMD focus during National Training Center and Joint Readiness Training Center rotations for combat training center (CTC) scenario development. These rotations provide a means of supporting Global Response Force mission requirements and an opportunity to collect lessons learned across the warfighting functions. The U.S. Army Maneuver Support Center of Excellence lessons learned team (USACBRNS personnel) supports collection efforts at all CWMD-focused CTC rotations to influence development activities. ATP 3-90.40, once published, will provide

comprehensive maneuver doctrinal guidance for CWMD operations and a universal understanding of the roles and responsibilities of maneuver forces as the lead in CWMD operations. Additionally, USACBRNS instituted a "right seat ride" program that provides select graduates from the CBRN Basic Officer Leader's Course a development opportunity at one of the CTCs before arriving at their first duty assignment.

- USACBRNS is engaged in collaborative exercises, training events, and forums to inform the community. These efforts provide information for the CWMD-integrated learning plan and foster solutions development. Some of these efforts include the recently completed 2ID Micro Experiment, the Army Warfighting Assessment, How the Army Fights, Unified Challenge experiment, the Capabilities Needs Analysis Required Capabilities Workgroup, Army Council for CWMD Workgroup, and the 8th Army CWMD Warfighter Forum.

- **Materiel.**
  - Nuclear, Biological, Radiological Reconnaissance Vehicle (NBCRV) sensor upgrades are underway with a proposed fielding date of FY 24.
  - In an effort to modernize radiological detectors, the Army is fielding the Man-Portable Radiological Detection System (MRDS). The initial operational capability of MRDS begins in FY 21.
- **Leadership and Education.**
  - The Vice Chief of Staff of the Army recently approved two scholarship proposals from USACBRNS. Officers selected for these scholarships will have an opportunity to earn a master's degree from The Fletcher School of Law and Diplomacy, Tufts University, Medford, Massachusetts, or Goizueta Business School, Emory University, Atlanta, Georgia. These scholarships will provide selected participants with education in leader development, strategic decision-making, management of force structure, awareness of international CWMD challenges, diplomacy, and CWMD counter-proliferation and nonproliferation strategies.
  - USACBRNS has partnered with the Missouri State University Department of Defense and Strategic Studies, Washington, D.C., to provide future opportunities for officers attending the CBRN Captain's Career Course. These officers will be eligible to obtain a master's degree in defense and strategic studies with a focus on countering weapons of mass destruction. This is an existing program between Missouri State University and the National Defense University. The program is pending implementation following review and support by the Education Support Office, U.S. Army Installation Management Command. Following implementation and assessment, USACBRNS will consider expanding opportunities available to cadre.
  - In 2016, USACBRNS instituted a Rand Study: *Options for Improving the Identification and Communication of Civilian Requirements to DOD and the Army*. The study centered on CBRN Response Enterprise requirements from civilian stakeholders and potential ways to improve the establishment and communication of civilian requirements for the future refinement of Department of Defense CBRN response capabilities. Review of the report, in conjunction with the Homeland Defense Civil Support Office, U.S. Army Maneuver Support Center of Excellence, is ongoing to determine future engagement opportunities for a whole-of-government planning framework for domestic CBRN response planning.
- **Personnel.**
  - Over the past 7 years, more than 2,800 (220 officer and 2,691 enlisted) CBRN billets have been eliminated from the Army. Coupled with grade plate reductions, the Chemical Corps has lost capabilities that greatly impact CBRN readiness. USACBRNS is prioritizing the organizations, personnel, and capabilities that have been reduced or eliminated in order to identify which positions will be most impacted by a potential increase in force structure.
  - USACBRNS is preparing a proposal that would add the ranger skill identifier to additional officers and enlisted CBRN personnel within the U.S. Army Special Operations Command. Increasing the number of ranger-qualified CBRN personnel in special operations units will better prepare CBRN Soldiers to operate in environments with little to no support from general-purpose forces. The U.S. Army Infantry School will support the initiative, and it can accommodate the additional throughput to the U.S. Army Ranger School. The U.S. Special Operations Command also supports an increase in the number of ranger-qualified CBRN personnel.
- **Facilities.** The Chemical Defense Training Facility is expanding and enhancing training capabilities for joint and allied operational training. The Chemical Defense Training Facility is using immersive scenario sets that incorporate chemical, biological, toxic industrial chemical, and toxic industrial material hazards. The Chemical Defense Training Facility supports combatant command, interagency, and joint engagement strategies for CWMD. Completion of this initiative is expected in FY 19.

- **Policy.** Over the past year, Headquarters, Department of the Army, put forth tremendous effort in the development of the Army CWMD Strategy, but as we go through major shifts in policy, we must review the strategy. We need to ensure that the Army CWMD strategy is synchronized with ongoing efforts, while providing the required guidance to the Service that describes our roles and responsibilities as part of the whole-of-government CWMD mission.

Finally, serving as your 29th Chief of Chemical and Commandant of USACBRNS over these last 12 months has been an honor and a pleasure. I have thoroughly enjoyed visiting Soldiers and leaders at so many locations over the last year. Each engagement expanded my knowledge of our ever-evolving Regiment, leaving me confident that we are prepared to answer our Nation's call. It is evident that the men and women of our Corps continue to work hard to increase subject matter expertise, mentor subordinates in their charge, and make this Regiment better and more relevant than ever before.

I would like to thank the Soldiers, military leaders, and Department of the Army civilians who support this Regiment every day. I look forward to remaining in the community and continuing to work with you as I assume command of the 20th Chemical, Biological, Radiological, Nuclear, and Explosives Command this summer. Thank you for your continued support to this Regiment.

Endnote:

[1]ATP 3-90.40, *Combined Arms Countering Weapons of Mass Destruction*, expected publication date during 3d quarter FY 17.

Elementis regamus proelium!

Dragon Soldiers!





Regimental Command Sergeant Major

Greetings! My first few months as your Regimental Command Sergeant Major have truly been incredible. I have had the opportunity to engage with chemical, biological, radiological, and nuclear (CBRN) units; noncommissioned officers (NCOs); battalion, brigade, and division CBRN officers; and Dragon Warriors within the special operations community. During those visits, subjects of conversations ranged from Soldiers and leaders engaging in life-long learning through institutional, operational, and self-development to nesting efforts within the *Chemical Corps Regimental Strategy 2025*.[1] These engagements allowed me to implement initiatives that directly support the *Chemical Corps Regimental Strategy 2025* lines of effort (LOEs) and Army warfighting challenges.[2]

Trends from our combined training centers highlight the need to emphasize CBRN training at home station. A significant number of rotational training units are deploying with limited detection and decontamination equipment on hand to combat enemy CBRN threats. Establishing a habitual training relationship at home station helps inform leaders of capabilities employment and facilitate readiness. I implore all CBRN leaders to emphasize leader development. CBRN readiness within brigade combat teams largely depends on becoming involved in the military decision-making process and on ensuring that leaders at all levels understand our capabilities.



Command Sergeant Major Henney M. Hodgkins

LOE 1: Train CBRN Soldiers, Units, and Staff

The observer controller/trainer (OC/T) position is one of the premiere broadening assignments available for sergeants first class. As an OC/T, senior NCOs have the opportunity to share their platoon sergeant experiences with other leaders as they rotate through the combat training centers. The OC/T position also provides a unique opportunity for individual growth for senior NCOs. Our career management field (CMF) includes 67 enlisted OC/T positions across the force. Most leaders are familiar with the positions at Fort Irwin, California; Fort Polk, Louisiana; and Hohenfels, Germany. However, few know of the additional positions available in First Army units. In 2014, First Army formally converted all Regular Army and Reserve Component advisor positions to OC/Ts. The addition of the First Army positions provides the CMF with 48 additional broadening assignments. Army Regulation (AR) 614-200, *Enlisted Assignments and Utilization Management*, paragraph 8-8(b), outlines the basic criteria for assignment as an OC/T.[3] An OC/T position requires a 24-month stabilization. The most successful OC/Ts are considered for follow-on assignments as small-group leaders at the NCO Academy, Maneuver Support Center of Excellence, Fort Leonard Wood, Missouri. Senior NCOs interested in serving in these broadening assignments should contact the CBRN Enlisted Branch.

LOE 2: Develop Chemical Corps Leaders

Chemical Corps Soldiers and leaders must be broadened for positions of increased responsibility. Our Dragon Soldiers must go through tough, realistic training at home station and at combat training centers, with a focus on our CBRN competencies. In addition, our junior and senior NCOs must continue to compete in battalion, brigade, and installation level promotion boards; Sergeant Audie Murphy Club boards; and competitions. These boards and competitions are critical for professional development and growth. Senior CBRN NCOs and leaders must embrace the challenges of Army Warfighting Challenge (AWFC) No. 5, *Counter Weapons of Mass Destruction*, and AWFC No. 6, *Defending the Homeland*, as they prepare for missions for Defense Security Cooperation Agency operations around the globe and in the homeland.[4] Leaders must understand the importance of the way in which AWFCs are aligned and nested with the *National Defense Strategy*, the *Quadrennial Defense Review*, and *The U.S. Army Operating Concept*.[5, 6, 7] Lastly, our master sergeants, first sergeants, sergeants major, and command sergeants major must continue to seek broadening opportunities such as Training With Industry (TWI) positions, White House Fellowships, Army staff positions, and other joint assignments that will posture them to better understand the critical thinking roles of the strategic imperative.

In direct support of the *Chemical Corps Regimental Strategy 2025* LOE 1 and LOE 2 and AWFC No. 5, members of our Directorate of Training and Leader Development, U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS), worked in conjunction with the Defense Nuclear Weapons School, Kirtland Air Force Base, Albuquerque, New Mexico, to create unique training events for the CBRN Captain's Career Course and Warrant Officer Advanced Course.[8, 9] The newly developed training provides our young officers with the opportunity to analyze geography that mimics a nuclear post-blast site and assess actual (not simulated), residual radiological/nuclear contamination hazard levels within the site and surrounding areas.

This training also includes tasks such as—

- Identify and determine the extent of radiological/nuclear hazards.
- Provide instruction to maneuver commanders on troop personal protection that is required at each location to safely maintain freedom of maneuver within the operational environment.
- Collect airborne radioactive samples.
- Define the scope of the national nuclear weapons program.
- Describe national military response plans for a nuclear incident.

The Directorate of Training and Leader Development and Defense Nuclear Weapons School staffs are confident that, at the end of this training, officers will be better able to provide their future units and commanders with accurate information on the identification of radiological/nuclear threats, materials, sources, and enemy capabilities in an area of operations.

LOE 4: Take Care of Our Profession

The Army Career Tracker is a vital tool used in the professional development of Soldiers.[10] This Web site, used by senior career development managers, provides Soldiers throughout the ranks with necessary career development information, including duties and job positions that are necessary for growth and progression within the Soldier's specific CMF. The CBRN senior professional development manager used the Army Career Tracker administration subfield to publish a meaningful career progression pathway. This ensures that all Soldiers within the CBRN CMF have access to the same information, which enables them to achieve their goals of career progression. We request that all CBRN Soldiers register for an ACT account and join the 74A and 74D community pages.

With the publication of the new Department of Defense Instruction 1322.06, *Fellowships, Legislative Fellowships, Internships, Scholarships, Training-With-Industry (TWI), and Grants Provided to DOD or DOD Personnel for Education and Training*, the Chemical Corps, along with other government and commercial agencies, has the opportunity to participate in TWI.[11] We are currently submitting initiatives for TWI at the Joint Program Executive Office, Aberdeen Proving Ground, Maryland, and Dugway Proving Ground, Utah, for fiscal year 2018. These private-sector hosts will utilize and train CBRN officers and NCOs; and the TWI period will be followed by a utilization tour. The expectation is that the private-sector hosts will provide state-of-the-art training in hazmat research and/or hazmat response. The Soldiers will then be able to use the training and experience in developing future CBRN defense systems, techniques, and procedures as well as influence equipment development. This initiative should develop a long-standing and positive relation between the Chemical Corps and private-sector hosts.

Accolades

Congratulations to the following Soldiers and Department of the Army civilian for being selected for Instructor of the Year for their respective categories: Staff Sergeant Joshua P. Robinson, 58th Transportation Battalion, NCO category; Captain Nikki D. Martinez, Headquarters and Headquarters Company, 3d Chemical Brigade, officer category; and Mr. James L. Benton, Incident Response Training Department, civilian category.

Endnotes:

[1]*Chemical Corps Regimental Strategy 2025*, <http://www.wood.army.mil/newweb/chemical/documents/CCRS_2025.pdf>, accessed on 14 April 2017.

[2]Ibid.

[3]AR 614-200, *Enlisted Assignments and Utilization Management*, 26 February 2009.

[4]U.S. Army Training and Doctrine Command (TRADOC) Pamphlet 525-3-1, *The U.S. Army Operating Concept—Win in a Complex World*, 31 October 2014, <http://www.tradoc.army.mil/tpubs/pams/tp525-3-1.pdf>, accessed on 15 December 2016.

[5]Department of Defense, *National Defense Strategy*, June 2008, <http://archive.defense.gov/pubs/2008NationalDefenseStrategy.pdf>, accessed on 14 April 2017.

[6]Department of Defense, *Quadrennial Defense Review 2014*, 4 March 2014, <http://archive.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf>, accessed on 14 April 2017.

[7]TRADOC Pamphlet 525-3-1.

[8]*Chemical Corps Regimental Strategy 2025*.

[9]TRADOC Pamphlet 525-3-1.

[10]Army Career Tracker Web site, <https://actnow.army.mil>, accessed on 14 April 2017.

[11]Department of Defense Instruction 1322.06, *Fellowships, Legislative Fellowships, Internships, Scholarships, Training-With-Industry (TWI), and Grants Provided to DOD or DOD Personnel for Education and Training*, 12 October 2016.

Elementis regamus proelium!

Regimental Chief Warrant Officer

Greetings Dragon Soldiers!

Over the past several months, I have had the privilege of visiting your installations, units, and training exercises. Throughout my visits, I have engaged Dragon Soldiers and leaders from team and company levels up to the Army Service Component Command level. With each engagement, I garnered invaluable feedback to assist in the shaping of initiatives in the areas of manning; accessions; professional military education; training; leader development; and chemical, biological, radiological, and nuclear (CBRN) equipment. The overarching theme for each engagement revolved around readiness.



Chief Warrant Officer Two
Jesse S. Deberry

Readiness is not only the No. 1 priority of the Chief of Staff of the Army; it is also intrinsic to the *Chemical Corps Regimental Strategy 2025* and its lines of effort (LOEs).[1] The *Chemical Corps Regimental Strategy 2025* LOEs are as follows:

- LOE 1: Train CBRN Soldiers, units, and staffs.
- LOE 2: Develop Chemical Corps leaders.
- LOE 3: Enhance and expand the counter weapons of mass destruction (CWMD)/CBRN defense capability.
- LEO 4: Take care of our profession.
- LOE 5: Build and maintain international partner capacity.

Our readiness spans from the training, health, and welfare of our young Dragon Soldiers to the operational readiness rates of our Nuclear, Biological, Chemical Reconnaissance Vehicle (NBCRV), which plays a vital role in what Dragon Soldiers are here for: supporting the warfighter; increasing CBRN readiness; and building capability and capacity. Ensuring that maneuver commanders are properly warned, advised, and prepared to fight in, or avoid the effects of, a CBRN environment is more prevalent now than ever before.

Next, I will provide updates to my initiatives through the lens of the *Chemical Corps Regimental Strategy 2025* LOEs:

- LOE 4. Beginning in June 2017, graduates of the Warrant Officer Candidate School will have to successfully complete the high physical demands test (HPDT) as a graduation requirement of the CBRN Warrant Officer Basic Course. The HPDT will verify that all new Military Occupational Specialty (MOS) 740A accessions are capable of performing all highly physically demanding tasks required while serving in entry level positions.
- LOE 2. Mid-grade chief warrant officer twos (2 years time in grade) may now apply to become training, advising, and counseling officers at the Warrant Officer Career College. Eligibility and prerequisites for applications can be found at <http://usacac.army.mil/cac2/WOCC/repository/WOCS_TAC_Officers_ver2.pdf>.
- LOE 2. CBRN warrant officers now have the opportunity to serve as survey team leaders (STLs) on civil support teams. The addition of the XZ coding to the STL position allows the Adjutant General of a state to assign a captain or MOS 740A (CBRN warrant officer) to the STL position. The STL position is an Active Guard and Reserve position.
- LOE 3. In my last article, I mentioned that the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS), Fort Leonard Wood, Missouri, was in the developmental stages of creating Training with Industry (TWI) opportunities for CBRN warrant officers at the Joint Program Executive Office (JPEO)–CWMD, Aberdeen Proving Ground, Maryland. This initiative is quickly taking shape thanks to the collaborative efforts of USACBRNS and JPEO. We expect the first MOS 740A to participate in JPEO–CWMD TWI late in fiscal year 2018. Warrant officers selected for the JPEO–CWMD TWI program will serve 12 months on the JPEO–CWMD staff. The selected warrant officers will then be assigned to the Research Development Department, Maneuver Support Center of Excellence, Fort Leonard Wood, as material developers.
- LOE 3. Maintenance issues, parts costs, and lack of training are some of the ongoing challenges associated with the NBCRV platform. USACBRNS is working on several near-term solutions to mitigate some of these challenges.
- LOE 4. In an effort to gather candid feedback on the utilization and development of CBRN warrant officer cohort, I launched two surveys: a senior leader survey and a post-graduate/job analysis survey. Results from these surveys will help to facilitate the MOS 740A Critical Site Selection Board, improve CBRN warrant officer utilization, and improve MOS 740A initial military training and professional military education.

I recommend the following as suggested reading for warrant officers:

- Rick Maze, "Radical Change is Coming: Gen. Mark A. Milley Not Talking About Just Tinkering Around the Edges," *Association of the United States Army Magazine*, Vol. 67, 13 December 2016,< https://www.ausa.org/articles/radical-change-coming-gen-mark-milley-not-talking-about-just-tinkering-around-edges>, accessed on 13 April 2017.
- Combined Arms Center, *Leader's Guide to Objective Assessment of Training Proficiency*, December 2016.
- Mark A. Milley, *Army Readiness Guidance, Calendar Year 2016–17*, 20 January 2016.

In closing, I would like to thank each and every one of you for all that you do. I'm proud and humbled to serve you and look forward to what we will accomplish in the future. Honor and glory to the Regiment!

Endnote:

[1]*Chemical Corps Regimental Strategy 2025*, <http://www.wood.army.mil/newweb/chemical/documents/CCRS_2025.pdf>, accessed on 13 April 2017.

References:

The Army Warrant Officer 2025 Strategy in Support of Force 2025 and Beyond, 2016, <http://www.tradoc.army.mil/tpubs/misc/WO2025_Strategy_20160329.pdf>, accessed on 13 April 2017.

U.S. Army Research Institute of Environmental Medicine Technical Report T16-2, *Development of the Occupational Physical Assessment Test (OPAT) for Combat Arms Soldiers*, October 2015, <https://www.defense.gov/Portals/1/Documents/wisr-studies/Army%20-%20MEDCOM%20USARIEM%20Task%20Assessment3.pdf>, accessed on 13 April 2017.

Elementis regamus proelium!





Disciplined Disobedience:

Army Chief of Staff Highlights Ethics of Command

By Captain Jonathan L. Duran

Disciplined disobedience that accomplishes the commander's intent should not be ignored; but at times, should be expected from a professional subordinate. Army Chief of Staff General Mark A. Milley, speaking at the 2016 Association of the U.S. Army Annual Meeting and Exposition, said that Soldiers should have "the willingness to disobey specific orders."[1] This embodies the idea that Army professionals must be willing to do what it takes, ethically and legally, to win battles and wars. The idea of the Army Chief of Staff supporting any level of disobedience to orders and choosing not to support all the tenets of unified land operations highlights the complex relationship between military law and customs on one hand and winning the Nation's wars on the other. General Milley's message supports the unified land operations tenets of flexibility, integration, adaptability, lethality, and depth, but not that of synchronization. By understanding the framework of the tenets and recognizing that current ground conditions are probably different from what is perceived at the tactical operations center, we see that synchronization transforms to coordinated, disciplined initiative.

Fighting and winning the Nation's wars are the main purposes of all branches of the military. Unity of effort is an overarching idea under which every military action is supposed to fit, but it must be fundamentally examined to understand what it means. Joint Publication 3-0, *Joint Operations*, defines unified action as "a comprehensive approach that synchronizes, coordinates and, when appropriate, integrates military operations with the activities of other governmental and NGOs [nongovernmental organizations] to achieve unity of effort."[2] Unified action drives each branch's principles to unify its diverse capabilities to achieve unity of effort. The Army doctrinal perspective is that unity of effort is achieved through the unified land operation tenets of flexibility, integration, adaptability, lethality, depth, and synchronization.

"The Army doctrinal perspective is that unity of effort is achieved through the unified land operation tenets of flexibility, integration, adaptability, lethality, depth, and synchronization."

In General Milley's speech, he described the battlefield of the future and how Soldiers must anticipate situations in which subordinates cannot contact their headquarters due to enemy jamming and hacking. General Milley maintains that Soldiers and leaders in such situations must be willing to disobey some orders. Future conditions will require decentralized execution and the exercise of mutual trust within the team. In his book, *The Mission, the Men, and Me*, Pete Blaber sums up this idea in the lesson of always "listen[ing] to the guy on the ground."[3] Naturally, this results in more control for the commander on the ground than the overall commander, thus transforming a specifically synchronized plan into coordinated, disciplined initiative.

Due to the developing situation, the tenet of synchronization may become impossible to achieve and the ground commander might have to disobey orders to be successful. This characteristic should be expected from professional subordinates, who must remain focused on achieving the commander's intent at all times. The prudent risk accepted by the commander is not limited to physical injury. It recognizes that some degree of control could be exchanged for a better opportunity for mission success. Just as mission variables change the chosen course of action, the physical battlefield of the future will drive the Army to learn and force its publications to evolve. The evolution of Army tactics, techniques, and procedures is constant and necessary for the U.S. Army to lead the world.

Although the evolution of tactics, techniques, and procedures is practical, Army Doctrine Publication 3-0, *Unified Land Operations*, defines synchronization as "the arrangement of military actions in time, space, and purpose to produce maximum relative combat power at a decisive place and time."[4] How Soldiers, weapon systems, and equipment are arrayed on the battlefield at a given time must be mutually supporting to achieve the commander's desired end state. Synchronization is crucial for combined arms operations and is paramount during the fundamental functions of breaching operations: suppression, obscuration, securing, reduction, and assault. All offensive characteristics hinge on the organization and efficiency of breaching efforts to accomplish the mission and gather mass on the objective.

Synchronization is pivotal in all operations, cementing its place as a unified land operations tenet. However, realizing that synchronization is crucial for any mission, the environment that General Milley described is one of volatile mission variables. This may require professionals to disobey outdated orders, exercise disciplined initiative, and shift planned synchronization to coordinated execution from initiatives. No battle in the American Revolutionary War was ever completely synchronized, but goals were always coordinated to ensure unity of effort. This is why there are redundancies throughout every operation, from dual priming and initiating explosives to the succession of command. For this reason, leaders always plan for logistical coordination, not synchronization.

For every idealized plan of execution, there is an execution that suffers from an idealized plan. General George S. Patton Jr.'s maxim that "A good plan, violently executed now, is better than a perfect plan executed next week"[5] epitomizes the need for coordinated, disciplined initiatives rather than synchronized efforts. Although General Milley's statement reinforces most unified land operation tenets, it does not validate the tenet of synchronization—nor should it, since no plan survives contact with reality.

Endnotes:

[1]Sydney J. Freedberg, "Miserable, Disobedient and Victorious: Gen. Milley's Future US Soldier," 5 October 2016, <http:breakingdefense.com>, accessed on 9 January 2017.

[2]Joint Publication 3-0, *Joint Operations*, 11 August 2011.

[3]Pete Blaber, *The Mission, the Men, and Me: Lessons From a Former Delta Force Commander*, Berkley Caliber, New York City, New York, 2 December 2008.

[4]Army Doctrine Publication 3-0, *Unified Land Operations*, 10 October 2011.

[5]The Official Web site of General George S. Patton Jr., <http://www.generalpatton.com/quotes/>, accessed on 9 January 2017.

Captain Duran is a student in the Engineer Captains Career Course at Fort Leonard Wood, Missouri. His previous assignment was with Company A, 29th Engineer Battalion, 25th Infantry Division, Schofield Barracks, Hawaii. He is a graduate of the U.S. Army Airborne School, the U.S. Army Air Assault School, the U.S. Army Ranger School, and the Sapper Leader Course. Captain Duran holds a bachelor of science degree in manufacturing and mechanical engineering technologies.



EXAMINING THE 20TH CBRNE COMMAND IN 2016

By Brigadier General William E. King IV

In 2016, the 20th Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Command operated on five of seven continents, providing CBRNE professionals to combatant commanders while undergoing force design updates in explosive ordnance disposal (EOD) and chemical, biological, radiological, and nuclear (CBRN) force structure as well as EOD Total Army Analysis reductions in force. Throughout 2016, the command continued to build partnership capabilities and capacity with local and state first responders in the homeland and partners and allies around the globe.



A U.S. trainer with Task Force Atlas shows border guard police officers various improvised explosive devices during explosive hazards awareness training at Al Asad Air Base, Iraq.

CBRN Force Design Update

According to Colonel Christopher J. Cox, 48th CBRN Brigade Commander, "Throughout its history, the Army has activated and inactivated units over time as it requires them to meet the missions that it foresees require accomplishing."

The 20th CBRNE Command activated two companies in 2016. In April, it activated the 10th Hazardous Response Company, Fort Carson, Colorado, which was originally constituted in 1938 and activated at Edgewood Arsenal, Maryland. In June, the 45th Hazardous Response Company, Joint Base Lewis–McChord, Washington, was activated. This company was constituted on 12 March 1942 as Company B, 81st Chemical Battalion, and later activated on 25 April 1942, at Fort D. A. Russell, Texas. These two hazardous response companies belong to the 48th CBRN Brigade, Fort Hood, Texas.

Their core mission is to provide CBRN reconnaissance, surveillance, and decontamination support to assigned areas of operations. And as Colonel Cox said during the activation of the 10th Hazard Response Company, "The unit's reactivation demonstrates our Army's commitment to attacking the menace of chemical, biological, radiological, and nuclear hazards presented to the homeland, to our deployed forces, and to our allies and international partners."

The activation of these two hazard response companies was critical because it removed the requirement for the CBRN brigade to be perpetually preparing to deploy in support of the defense CBRNE response force mission. Now, the command can rotate units through this mission set. This was achieved by standardizing the CBRN battalion structure and rightsizing the company structure.

Restationing

Lieutenant Colonel Timothy Druell, 22d CBRN Battalion (Technical Escort) Commander, indicated that "This restationing allows us to better serve brigade and division commanders providing critical CBRN support to maneuver elements."

On 10 June, Soldiers from the 22d CBRN Battalion stood on the parade field at Edgewood Chemical Biological Center, Aberdeen Proving Ground, Maryland, for the final time. The 22d CBRN Battalion and its subordinate elements relocated to U.S. Forces Command installations across the United



59th CBRN Company Soldiers respond to a training scenario in the smoke-filled subway trainer at the FDNY Fire Academy. Photograph by Technical Sergeant Joe Laws

States in accordance with U.S. Forces Command and Department of the Army direction. Restationing allows the 22d CBRN Battalion to better enable its units to train with and support Army divisions and to ensure that the 20th CBRNE Command can provide the Department of the Army and combatant commanders with ready, reliable, and globally responsive forces. It also fully implements the CBRN Corps Force Design Update by placing a highly specialized technical escort company in each of the four CBRN battalions across the continental United States.

Operations

New York City Fire Commissioner Daniel Nigro said, "The missions of the military and the fire department [have] never been closer; what we have learned from the 59th [Hazard Response Company] is immeasurable."

The 59th Hazard Response Company, Fort Drum, New York, became the first Regular Army CBRN unit to train in New York City with the New York City Fire Department (FDNY) Hazardous Material Team. This training improved the 20th CBRNE Command ability to support civil authorities in one of the biggest terrorist targets in the world if the call arises. The training location could not be better either; the 20th CBRNE Command was allowed to train with the FDNY Hazardous Materials and Items Division team at Pennsylvania Station. There are challenges inherent in working with outside agencies, but to train together in one of the busiest and most well-known subway stations in the world only made the training more realistic. During the training, the 59th responded to coordinated chemical and biological attacks that overwhelmed local authorities, forcing them to request help from the federal government. This training allowed each team to better understand each unit's operating procedures, technical terms, and communication. This is exactly the type of training the 20th CBRNE Command conducts throughout the year; the training focused on improving interoperability and building capacity and capabilities in each organization.

This training was so successful that the 59th Hazard Response Company returned to New York City to continue to improve upon command, control, and communication with the FDNY Hazardous Materials and Items Division. In December, the 59th conducted defense chemical, radiological, and nuclear response force sustainment training with FDNY. The highlight of the training took place at Fort Hamilton, Brooklyn, New York. The main task of this training was to test the concept of handing over the community reception center from FDNY to the 59th Hazard Response Company. This training forced the 59th to integrate into the fire department's incident command structure and operate a community reception center. The handover allowed FDNY to execute its mission in New York City while the 59th provided support to FDNY and the city of New York.

In addition to the training in New York, nuclear disablement teams and CBRNE response teams certified as part of the National Technical Nuclear Forensics Center mission during the Prominent Hunt exercises in Philadelphia, Pennsylvania, and Tampa, Florida, working in a direct support role to the Federal Bureau of Investigation, the Department of Energy, and the Department of Homeland Security. During the exercise in Philadelphia, the nuclear disablement teams used the advanced ground-sampling collection platform for the first time. The platform allows the task force to perform radiation reconnaissance and ground sampling after a nuclear detonation that caused an area to be deemed too dangerous for people to conduct sampling.

CBRN units conducted exercises in the homeland and abroad. In June, members of the 48th CBRN Brigade participated in Operation Iron Mask in Germany. Operation Iron Mask brought together CBRN soldiers from Denmark and the Netherlands as well as U.S. Soldiers from the 2d Cavalry Regiment and a CBRNE response team from the 110th CBRN Battalion. The CBRNE response team was tasked to accomplish diverse problem sets outside the scope of traditional CBRNE response team operations: assessment of an active chemical plant to predict future hazards; response to a train derailment with suspected chemical agent; conduct of a combined area reconnaissance with a German reconnaissance team and American EOD assets for a suspected chemical mortar firing point; and assessment of buildings containing multiple improvised explosive devices and clandestine laboratories for homemade explosives, radiological dispersal devices, and mustard and biological research. This exercise improved CBRN interoperability between North Atlantic Treaty Organization allies from the United States



The 10th Hazard Response Company commander leads her Soldiers during the unit activation ceremony. Photograph by Scott Prater

and Europe. North Atlantic Treaty Organization observers and participants considered Operation Iron Mask a monumental success.

Later in the year, the 48th CBRN Brigade joined 25,000 U.S. Service members participating in Operation Ulchi Freedom Guardian. The 48th trained with the U.S. Army 2d Infantry Division/Republic of Korea combined division, the Army's only permanently forward deployed combat division. This training allowed the 48th to integrate with the 2d Infantry Division as it focused on maintaining stability on the Korean Peninsula. During Operation Ulchi Freedom Guardian, the Eighth Army validated the 20th CBRNE Command as Combined Joint Task Force–Elimination under the Eighth Army, the U.S. Army top operational command in the Republic of Korea. This certification was a milestone for the command, as it was last validated as a Joint Task Force–Elimination in 2009.

During 2016, the EOD units also made significant contributions to peace and security around the globe while inactivating 13 companies and 2 battalions. The 52d Ordnance Group (EOD) successfully stood up Task Force Atlas in Kuwait, providing expertise for Operation Inherent Resolve for three main areas: attack the network, train the force, and defeat the device. A CBRNE coordination element also deployed in support of Operation Inherent Resolve. Following a successful and productive 9 months, the 52d Ordnance Group conducted a transfer of authority to the 71st Ordnance Group (EOD), which assumed the Task Force Atlas mission in November.

While the EOD Group Headquarters deployed to Kuwait, its EOD companies set the standard for humanitarian mine action and counter-improvised explosive device training in Africa. The EOD teams conducted training on the elimination of landmines, the disposal of explosive remnants of war, and the management of national ordnance stockpiles. U.S. Army Africa is seeking approval to increase from a company size mission to a battalion size mission, allowing the increase of capacity and capabilities of the armies on the African continent.

In the United States, the two EOD groups remained actively engaged, providing EOD support to the Secret Service during the Presidential election cycle. While this was occurring, the 797th Ordnance Company (EOD) deployed to Camp Minden, Louisiana, to destroy 85,000 pounds of clean-burning igniter and 40,000 pounds of M6 propellant.

Finally, the CBRNE Analytical and Remediation Activity Laboratory deployed a mobile expeditionary laboratory to the U.S. Central Command theater of operations with a mission to analyze field samples of suspect chemical and biological agents at confirmatory and theater validation levels. The CBRNE Analytical and Remediation Activity Laboratory also deployed outside the United States to assess munitions under its recovered chemical warfare material mission.

Achievements

"When I told the unit in formation that we were named the 2016 recipients [of the Sibert Award], everyone began clapping and cheering. Being part of a Sibert Award organization is truly a major highlight for every Soldier's career in the unit," said First Sergeant Toby Shirley.

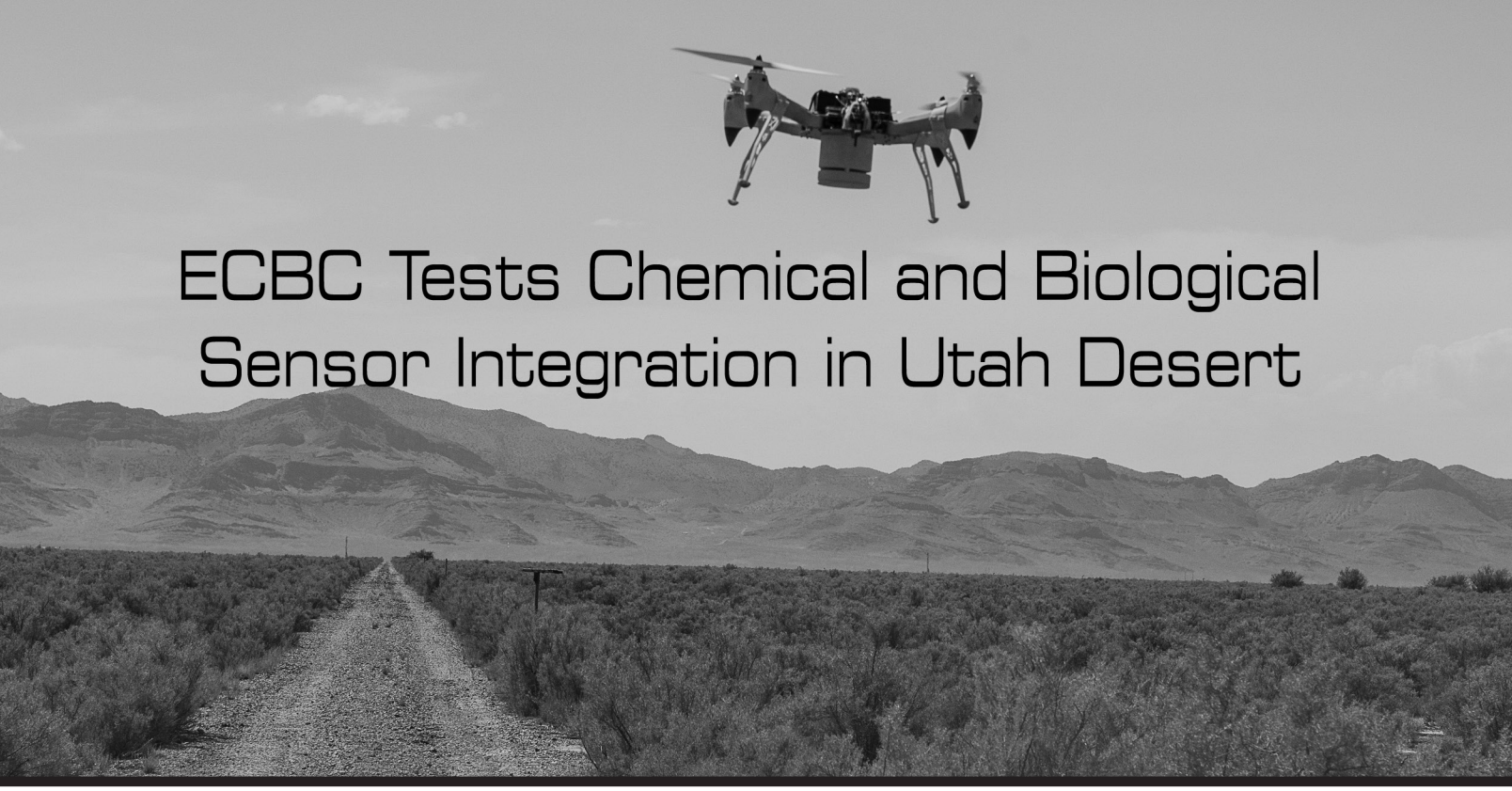
The 172d Hazard Response Company, Fort Riley, Kansas, was awarded the 2016 Major General William L. Sibert Award in the Regular Army category. The Sibert Award is presented to the CBRN unit that best demonstrates excellence in the Chemical Corps and in its focus on mission readiness and organizational excellence.

The EOD team from the 722d Ordnance Company, 192d EOD Battalion, Fort Bragg, North Carolina, led by Staff Sergeant Jason Fedak, was designated as the 2016 Best EOD Team of the Year. The competition took place at Fort A. P. Hill, Virginia, 12–16 September.

Conclusion

The year of 2016 was a busy one for the 20th CBRNE Command and its subordinate units. It was filled with many firsts and great milestones. And the tempo is not expected to slow in 2017. The year kicked off with the Presidential inauguration, followed by a CBRNE task force led by the 2d CBRN Battalion, which conducted operations at National Training Center Rotation 17-04 in support of the 2d Brigade Combat Team, 1st Cavalry Division, Fort Hood, Texas. The 20th CBRNE Command will support operations in Canada, Korea, and Germany and in the homeland in Washington, West Virginia, Oregon, and Indiana. The Soldiers, civilians, and contractors of this command remain dedicated to providing our Nation with ready and reliable Soldiers, "Anytime, Anywhere."

Brigadier General King is the commander of the 20th CBRNE Command, Aberdeen Proving Ground, Maryland. His previous assignment was as the deputy assistant chief of staff, G-3/5/7 (Readiness), U.S. Army Forces Command, Fort Bragg, North Carolina. He is a graduate of the Industrial College of the Armed Forces War College and has also earned four master's degrees.



ECBC Tests Chemical and Biological Sensor Integration in Utah Desert

By Dr. Brian B. Feeney

The U.S. Army Edgewood Chemical Biological Center (ECBC), Aberdeen Proving Ground, Maryland, joined with technology developers from Army, joint, and private-industry organizations, 15–26 August 2016, to test a new, integrated system of chemical and biological agent sensors at Dugway Proving Ground, West Desert Test Center, Utah. The test took place at a U.S. Army Test and Evaluation Command technology demonstration called the Sophos/Kydoimos (S/K) Challenge. The ECBC team participated after nearly a year of preparation. Scientists and engineers from ECBC developed an unmanned aerial vehicle called Deep Purple and modified an unmanned ground vehicle known as the Mobile Detection Assessment and Response System (MDARS) for the event.

These systems operated as platforms for chemical and biological sensors, which were tested against a variety of simulant agents to determine whether the sensors could correctly identify the agents. ECBC scientists and engineers modified existing sensor packages to fit inside a container called the Array Configurable of Remote Network Sensors, which is affixed to the bottom of Deep Purple or mounted on the roof of MDARS. Those sensor packages include the Tactical Biological Generation II Detector (TACBIO) and the Joint Chemical Agent Detector. The TACBIO rapidly detects the presence of an airborne biological threat, and the Joint Chemical Agent Detector is an automatic chemical warfare agent detector.

In many ways, Deep Purple was the star of the show for ECBC. It is a carbon fiber quadcopter (also called a quadrotor helicopter) drone made with commercial, off-the-shelf parts. Deep Purple was developed in partnership with the Johns Hopkins Physics Laboratory for the Defense Threat Reduction Agency. It is unique because it is capable of carrying a 5-pound payload of sensors.

The ECBC Advanced Design and Manufacturing Branch used its 3D printing capability with a number of innovations to assist in creating the drone. Hollow arms held the propellers and housed wires internally. The airframe used printed circuit boards rather than functionally inert carbon fiber to allow direct, real-time communication between the payload and the drone operator. The information provided by the sensors would be relayed in real time to Soldiers in the field and mission command personnel up to 2 miles away.

The testing took place at night to take advantage of just the right desert wind effects, which occur after 11 p.m. The team worked intently every night until 5 a.m. Upon each agent release, the drone lifted straight up, with green and red lights blinking, and headed off into the desert night to intercept the simulant agent cloud. Likewise, the unmanned ground vehicle traveled down dirt roads, following the vectors provided by a laser detection system operated from a nearby trailer.

ECBC team leader and principal investigator, Mr. Alan Samuels, Ph.D., stated that the S/K Challenge provided an opportunity to test how reliably and responsively Deep Purple, MDARS, and the sensors operate as chemical and biological early warning sensor technologies. He explained that the chemical sensors mounted on Deep Purple intercepted the cloud and identified the simulants; however, TACBIO was too large for Deep Purple and worked only on MDARS. It needed to be miniaturized. He added that the S/K Challenge proved its value to ECBC by revealing what worked



The ECBC Director holds Deep Purple, which proved its ability to intercept a chemical agent simulant cloud and identify the simulant.

well and what needed work. Information learned this year will be applied to testing next year.

According to Mr. Russell Bartholomew, one of the event organizers and a test officer at the newly established Bio-Testing Branch at ECBC, the annual S/K Challenge offers participants a low-cost opportunity to operate technology that is under development in a collaborative environment. He explained that it is a cost-sharing event that attracts participants from Department of Defense organizations, private industry, and international partners. They work together using individual technologies in concert, and the U.S. Army Test and Evaluation Command reviews the available technologies and their development progress.

The ability of ECBC scientists to remotely direct the Deep Purple and MDARS platforms and collect incoming data from the sensors in a single information-sharing system was just as much a demonstration of new, cutting-edge technology as operating the autonomous drones. It is a system-of-systems; every part must communicate with every other part so that it works as an integrated system, said Mr. Steven Lagan, a team member from ECBC Modeling, Simulation, and Analysis Branch. The location and movement data of the simulant cloud collected by stationary sensors can be sent to sensor-mounted vehicles, he added. The sensors then communicate the identity of the agent through a common operating language, and the data is shared with the participants and, under actual conditions, with the chain of command.

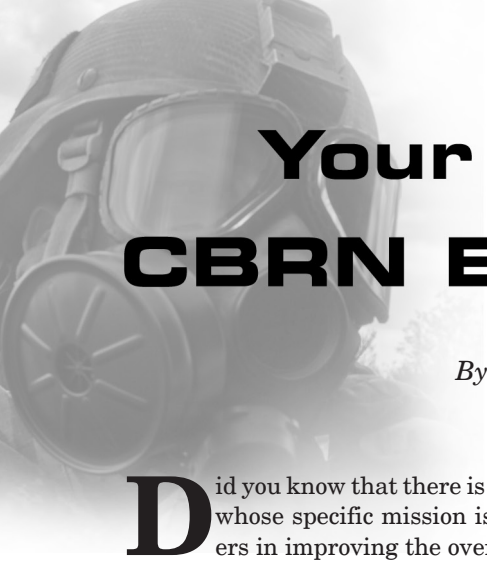
Creating a common language that could be used by all participants and the sensors was a project of just as great a magnitude as creating and perfecting the drones and unmanned vehicles. Mr. Max Bottiger, a team member at the ECBC Battlefield Information Branch, indicated that the team was working with different components from across the country. Team members wrote the programs and invented portions of software code that were compatible with the Army common operating language to make it work together.

ECBC Director Joseph Corriveau, Ph.D., attended the technology demonstration. "A diverse set of professionals working together made this happen. Not only the brightest people from private industry and other Army and joint organizations, but scientists and engineers from many different branches, divisions, and directorates within ECBC," he said. "There is a huge push from the Department of Defense to get on the forefront of this technology. This shows that we are collaborating to position ourselves well ahead of the rest of the world in chemical-biological defense," he remarked.



An interdisciplinary team of ECBC scientists and engineers receives data on a simulated chemical agent release and direct unmanned aerial and ground vehicles carrying sensors to intercept and identify the release.

Dr. Feeney is a contractor supporting the ECBC Public Affairs Office. He holds a bachelor's degree in history from Colorado College, Colorado Springs; a master's degree in risk communication from Cornell University, Ithaca, New York; and a Ph.D., in risk communication from Temple University, Philadelphia, Pennsylvania.



Your Unit Can Achieve CBRN Equipment Perfection

By Mr. Angel S. Castro-Rodriguez, Dr. John R. Kennedy, Mr. Kyle R. Phillips, and Mr. Troy D. Thompson

Did you know that there is a team of dedicated experts whose specific mission is to assist Army commanders in improving the overall readiness of their fielded chemical, biological, radiological, and nuclear (CBRN) equipment and ensuring serviceability and maintainability? There is. It is called the Equipment Assessment Unit (EAU). It is provided by the Engineering Directorate of the U.S. Army Edgewood Chemical Biological Center (ECBC) at Aberdeen Proving Ground, Maryland. The services are provided free of charge.

ECBC EAU

Just what does the EAU do if a unit decides to take advantage of its services? It makes an on-site visit to the unit. During the visit, the team can—

- Conduct a hands-on assessment of the condition of unit CBRN equipment.
- Conduct an assessment of the condition of protective masks using EAU test equipment.
- Provide hands-on refresher training on the use of CBRN equipment.

The EAU is composed of personnel with extensive hands-on experience with the specific CBRN equipment that they are assessing (Table 1 shows CBRN equipment that the EAU can assess.) Further, they are subject matter experts in numerous fields, to include chemistry, chemical engineering, electronics engineering, materials science, logistics, and acquisition. An EAU visit—

- Improves unit operational readiness and combat effectiveness.
- Enhances the unit readiness posture.
- Assists commanders in determining the condition of on-hand CBRN equipment and areas for improvement.
- Reinforces proper preventive maintenance checks and services (PMCS).
- Provides points of contact (POCs) for future CBRN equipment-related questions and issues.
- Identifies trends for CBRN equipment and communicates with the program manager to improve CBRN equipment.
- Provides out-briefs of the assessment findings.
- Provides refresher training to joint warfighters.
- Works closely with the U.S. Army TACOM logistic area representatives of the requesting unit.

The assessment process is not difficult for the requesting unit. The unit should provide a POC who will be responsible for the overall coordination of operations and assessment planning. A POC for each participating unit may also be designated. These POCs should be available throughout the assessment.

Protection Equipment	Detection Equipment	Decontamination Equipment
M-40 Series Protective Masks	M4 and M4A1 Joint Chemical Agent Detector	M26 Decontamination Apparatus
M-50 Series Protective Masks	M22 Automatic Chemical Agent Detector/Alarm	M12 Decontamination Apparatus
Joint Service Aircrew Mask, Apache Mask Protective Unit 6	Chemical Agent Monitor/Improved Chemical Agent Monitor	M295 Decontamination Kit
M41 Protection Assessment Test System	M21 Remote-Sensing Chemical Agent Alarm	M100 Sorbent
M20A1 Simplified Collective Protection Equipment	M256A1 Chemical Agent Detector Kit	Reactive Skin Decontamination Lotion
	AN/PDR-77 RADIAC	
	AN/PDR-75 RADIAC/DT-236	
	AN/UDR-13 RADIAC	
	AN/VDR-2 RADIAC	
Legend: RADIAC—radiation detection, indication, and computation		

Table 1. CBRN equipment that the EAU can assess

The EAU conducts hands-on, operator-level refresher training for the unit, if desired. A unit POC should coordinate the training space with an EAU representative. The unit POC is also responsible for the coordination of attendees.

The EAU team leader or representative conducts an out-brief at the end of the mission. Out-briefs include, but are not limited to, the following:

- Summary of the results.
- Detailed breakdown of common failure modes.
- Assessment of PMCS.
- Information about maintenance or repair that is required.
- Recommendations for future improvements in training and maintenance procedures.
- Shelf-life data.

Once the assessment is complete, a written report is provided to the unit commander. The report identifies any discrepancies, items requiring unit action, or unserviceable items. Figures 1–8 show graphic examples of discrepancies the EAU has found during some of its assessments.

Conclusion

The Engineering Directorate, ECBC, has a team of dedicated experts whose specific mission is to assist joint warfighters in improving the overall readiness of their fielded CBRN equipment to ensure serviceability and maintainability, enhancing unit operating readiness and combat effectiveness. The services supplied by the EAU provide long-term benefits to Regular Army, Army National Guard, and U.S. Army Reserve units in all areas of CBRN PMCS and build a network of contacts for future CBRN-related questions.

The EAU assists the commander in improving the condition of on-hand CBRN equipment and the effectiveness of preventive maintenance programs through the results and recommendations supplied during the visit and through a unit-specific report. It also provides hands-on, operator-level refresher training to designated CBRN personnel upon request.

The ECBC EAU assessment is minimally obtrusive and is conducted by experienced people who aim to direct their services to fit the individual needs and time constraints of

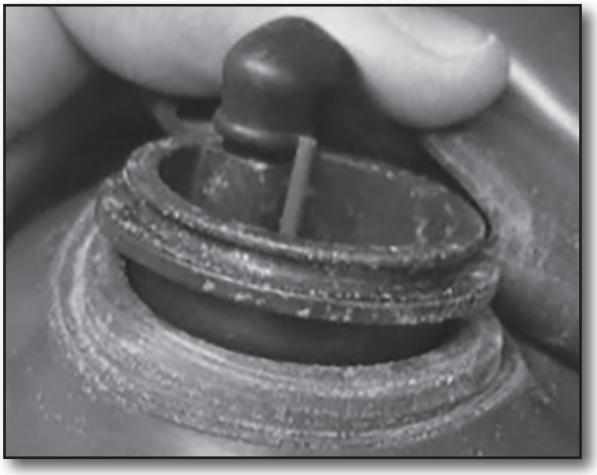


Figure 1. Disbonded M40 series protective mask outlet housing



Figure 2. M40 series protective mask with a torn face blank

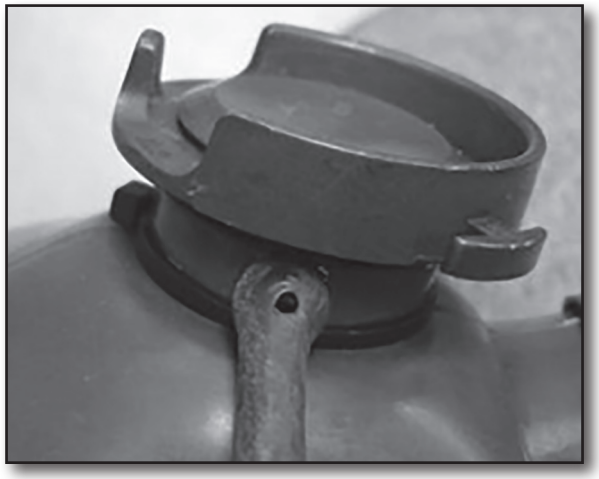


Figure 3. Torn M40 series protective mask external drink tube



Figure 4. Damage to the front of the voicemitter on a M45 protective mask

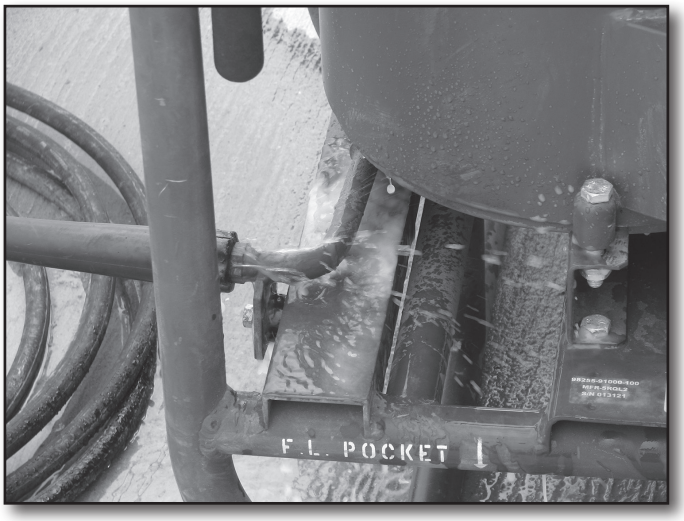


Figure 5. M26 decontamination aparatus O-ring faliure

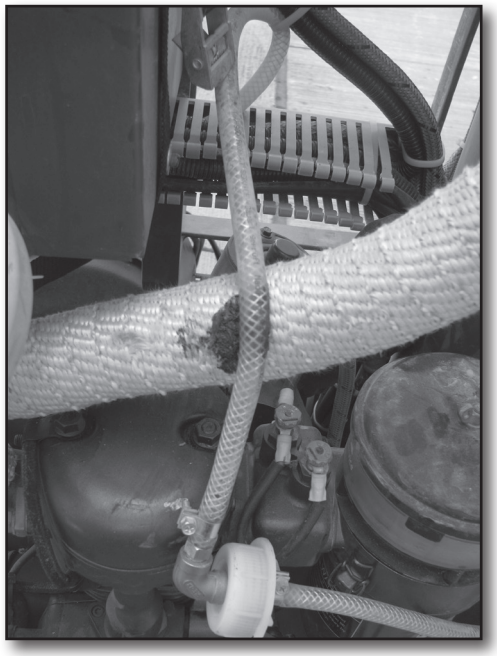


Figure 6. M26 decontamination apparatus calcium inhibitor suction line damage from exhaust pipe

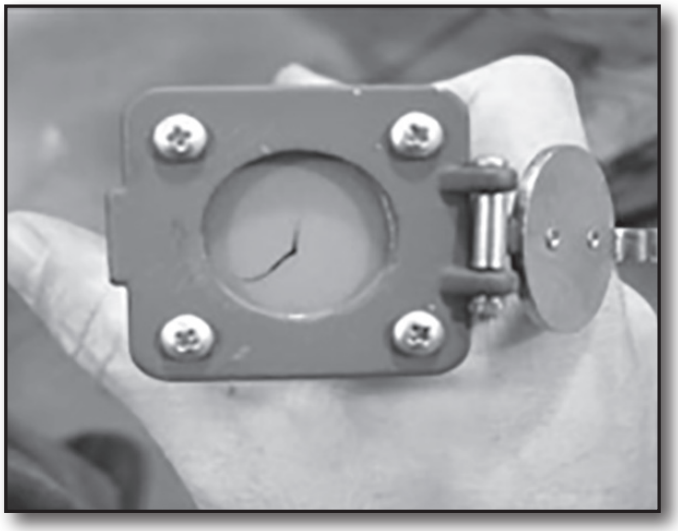


Figure 7. AN/VDR-2 RADIAC beta/gamma probe damage



Figure 8. AN/PDR-75 cable damage from separation

the unit. The results are briefed only to the command, and the service is free to the requesting unit.

To arrange an EAU visit, contact <usarmy.apg .rdecom-ecbc.list.dded@mail.mil>. If you have questions about ECBC, contact the public affairs office at <usarmy .apg.ecbc.mbx.communications-office@mail.mil>.

Mr. Castro-Rodriquez is an engineering technician within the Joint Service Respirator Sustainment and Test Technology Branch, ECBC. Before joining ECBC, Mr. Castro served in the U.S. Army Engineer and Chemical Corps.

Dr. Kennedy is a physical scientist at ECBC. He holds a bachelor of science degree in chemistry from New Mexico State University, Las Cruces, New Mexico; a master of science degree in physical chemistry from Texas Tech University, Lubbock, Texas; and a doctor of philosophy degree in physical chemistry from Texas A&M University, College Station, Texas. He is a retired lieutenant colonel, U.S. Army Reserve, and a graduate of the U.S. Army Command and General Staff College and the U.S. Naval War College, College of Naval Command and Staff. Dr. Kennedy is a member of the Army Acquisition Corps.

Mr. Phillips is a chemical engineer with the Detection Engineering Branch, ECBC. He holds a bachelor's degree in chemical engineering from the University of Maryland, College Park, and a master of science degree in environmental science and policy from Johns Hopkins University, Baltimore, Maryland.

Mr. Thompson is a chemist with the Decontamination Engineering Branch, ECBC. He holds a bachelor's degree in chemistry from Lincoln University, Oxford, Pennsylvania, and a master of science degree in material science engineering from Georgia Institute of Technology, Atlanta, Georgia.

LESSONS LEARNED FROM BATTALION COMMAND

By Lieutenant Colonel Adam W. Hilburgh

Before assuming battalion command, I often heard that it was the best and most rewarding assignment that an officer could have in the Army. After 2 years of training exercises, readiness alerts, staff meetings, counseling, late-night phone calls, laughs, and tears, I can confirm that it was absolutely the best and most rewarding assignment of my career. And I know I am not alone in my opinion, as most of my peers and those who came before us have expressed the same sentiments. Yet with any assignment or leadership opportunity, there are lessons to be learned and taken to the next assignment. In my case, after a period of 4 to 6 months of reflection after leaving my assignment, numerous mentors asked for my written thoughts on command. In taking that time to think, talk to peers, and talk with former subordinates, the lessons became more refined and, at times, surprising. I make no claims regarding any omniscience in the role of a commander; however, this article discusses lessons learned from my own foxhole during battalion command.

Each command is different based on the battalion's function, mission set, and location and the personalities of those within the battalion, adjacent to the battalion, and in higher headquarters. While I had some preconceived notions, it is important to understand the time and place of my battalion command experience, as it had a direct bearing on my perceptions and lessons learned. I commanded the 23d Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Battalion in the Republic of Korea (ROK) from June 2014 through June 2016, while stationed at Camp Stanley, Uijeongbu. The battalion was a subordinate unit to the 1st Brigade, 2d Infantry Division (2ID), during the first year; and when the brigade was deactivated during the second year, the 23d CBRNE Battalion became a direct reporting unit to 2ID. Each of these chains of command provided ample lessons learned and forced my staff and me to continually grow and learn.

Besides my Family, the most important people to me during battalion command were the two phenomenal command sergeants major with whom I worked. They say that command is lonely, but I did not have a lonely day in command due to my friendships with these two command sergeants major. A commander's relationship with the command sergeant major must be consistently fostered and maintained because a battalion does not properly function if the command team does not have a healthy respect for, and understanding of, each other, resulting in a singular shared intent. The command sergeant major, the heart and soul of the battalion, made my job easier through professional advice and positive initiatives that addressed potential issues before they became problems.

Although I taught mission command at Fort Leavenworth, Kansas; read the case studies; and listened to general officers and others testify to its importance, I did not expect mission command to become a focus. It wasn't until I arrived in ROK that I realized mission command would become a priority and the "intellectual umbrella" of my 2 years. It is the commander's responsibility to create space and a culture that builds shared understanding and mutual trust. Clear commander's intent, which we executed through a well-developed training management plan, is also an important part of mission command. I felt it was the operations officer's responsibility to translate the commander's intent into an operational reality through mission orders; then, subordinate units needed trust and understanding to take disciplined initiative and assume prudent risk.

Early in command, I was surprised about how much time was needed for counseling sessions. Before taking the colors, I intended to conduct an initial counseling session for every officer in the battalion and for the noncommissioned officers for whom I was the rater or senior rater. The executive officer and command sergeant major were crucial in ensuring the accomplishment of this task. Initial, quarterly, and evaluation counseling sessions were tracked. For more than 2 years, an average of 5 to 7 hours was spent each week counseling; sometimes, during turnover and evaluation periods, this number peaked at 20 hours or more. Routine time was set aside on my calendar; and at times, I was required to be flexible enough to provide counseling before physical training or after the duty day ended. In reflection, I realized that counseling was one of the most important tasks that I performed as a commander. It is a task that cannot be delegated, and it is the task that had the most far-reaching



The 23d CBRNE Battalion participates in a mask run.

impact on my ability to create mutual trust and shared understanding in the formation.

Each leadership school of the Army advocates the need to praise in public and counsel in private. To take this one step further, the expression of positive leadership in every situation involving Soldiers is an essential component of command and sometimes one of the toughest. The long hours, late telephone calls and, at times, perceived idiocy can get on anyone's nerves, but this is when positive leadership and treatment of individuals with dignity and respect are the most critical. In 2ID, the commanding general led the division to focus on character over competence. His mentorship opened our eyes, and the command sergeant major and I used the focus on character to define every interaction we had in the battalion. We scheduled time (30 minutes after physical training) to have character discussions with each team and platoon in the battalion on a rotational basis. Discussions of the Uniform Code of Military Justice were about character, rarely on competence.[1] This helped to maintain a disciplined unit in a trying environment characterized by constant turnover and many distractions. I also realized that my biggest regret as a company commander was focusing too much on indiscipline after it occurred, rather than first focusing on character. I believe many Soldiers could have been "saved" with this focus.

I quickly learned that annual training guidance is the foundational document of command, rather than something to simply publish and place on a shelf. It is the key component of a unit training management program and, if done right, provides predictability and routine for the battalion. The mantra was, "Great units do routine tasks routinely." The strength of annual training guidance is that it sets a larger framework between a command and its units regarding what is expected, how often it is expected, and to what standard it is expected for almost every task a unit must accomplish. This document articulates expectations and intent for physical training; competitions; ranges; gunnery; external evaluations; Army Regulation (AR) 350-1, *Army Training and Leader Development*, training; mission-essential task lists; and task proficiency to name but a few of the items.[2] The entire document is a manifestation of the commander's intent and serves as the contract between each echelon of the unit. There were numerous instances in which the command sergeant major and I had great ideas for competitions or professional development events, but would wait until the next quarter to prevent disrupting the established contract.

I wish I had spent more time being a great teammate to other headquarters and units. We did a good deal of training with ROK, our maneuver brethren, and other adjacent units, but I don't think there is a limit to what can be done. Our branch is unique, and the only way for us and others to learn is to work together. Even at the end of 2 years, we were continuously learning and adjusting what "*right* looks like." It is easy to spend most of your time focused on internal training, and that is a critical component of ensuring that units are trained and ready—but internal certification is not the end. A breach can't be completed with only engineers, and our missions are not conducted in a vacuum. In being a great teammate, it is important to stress that relationships matter more than anything else. While working with adjacent units and partners, every engagement should strengthen the relationship between the units.

We learned that external evaluations, rather than certifications, provided the feedback necessary to properly train teams and platoons. Certification implies a final test that must be passed perfectly, while an external evaluation allows for learning and relearning to ensure that units are prepared. The external evaluations evolved into a quarterly program in the 23d CBRNE Battalion, rotating between the chemical, biological, radiological, and nuclear (CBRN) response teams and hazardous assessment platoons (HAPs) (decontamination and assessment missions) and allowing leaders to rotate through execution and to reinforce knowledge though observer controller duties. This helped us

build a benchmark and cross-level tactics, techniques, and procedures through the battalion. We did not manage the technical training of the Nuclear, Biological, Chemical Reconnaissance Vehicle (NBCRV) crews at the battalion level because I saw them as squads that needed to be evaluated at the company level rather than battalion headquarters (two levels up). However, gunnery training was managed at the battalion level.

It is incredibly challenging to command our companies compared to when I was a company commander. The recent force development update provided capacity beyond our initial expectations. The battalion headquarters is more robust, and the HAPs have real capability. But maintenance challenges in the line companies are significant, especially with enlisted grade plate reductions in maintainers and low-density military occupational specialties. It is a challenge to balance NBCRVs; dismounted reconnaissance sets, kits, and outfits; decontamination; and communication—and battalion level supervision is required from the executive officer and maintenance team. Staff supervision of company execution of maintenance and supply must be ingrained.

Outside organizations routinely asked us to try new equipment. I finally decided that the criteria for agreeing would be that the new equipment would need to simplify a Soldier's load. We didn't need a third or fourth detector; we needed to lighten the load, logistical tail, and requirements to accomplish tasks. The new particle isotopic neutron spectros (PINS) and M53 mask are two great examples that simplified mission sets. I believe that we might overload Soldiers if we are not careful, especially with all the technical gear needed to accomplish missions.

I was incredibly impressed by the talent in our Corps. If we can train Soldiers and point them in the right direction, they will be able to accomplish assigned missions. The noncommissioned officers routinely surprised me with their initiative, technical knowledge, and ability to instill discipline in our units through a focus on fundamental tasks and tough physical training each morning. The CBRN warrant officers have a significant impact on readiness in our tactical units if we trust them and use them appropriately. Officers also have the ability to learn quickly and simultaneously accomplish multiple missions. I believe that we minimize the impact lieutenants have in our formations. I was extremely impressed by their work ethic and ability to quickly become dependable, knowledgeable leaders in their units. Our CBRN units are unique because they contain CBRN leaders at all levels who do not start out in tactical CBRN units; their first assignment may be as a HAP platoon sergeant or a line company commander. It is critical to build training plans that incorporate these differences while ensuring opportunities for growth in the technical areas of our profession.

The explosive ordnance disposal and CBRN relationship at the battalion level is a challenge due to the different cultures (and, for us, distance), but I saw an improvement in creating shared understanding over the course of 2 years. Explosive ordnance disposal teams were attached to HAPs during our external evaluations, creating a CBRN response team-like capability. We have more in common than not, and I think it is in the best interests of both branches to make it work culturally.

After a few months in command, I found that it is easy to become insulated as a commander, only talking with the staff and subordinate commanders. In addition to the daily physical training with different platoons or teams, I set aside time for breakfast and lunch with leaders of all ranks. This helped build trust and shared understanding throughout the formations and kept me informed. The highlight of my day was participating in physical training with Soldiers and having time to talk with them in the field, at the motor pool, and during meals.

I learned that if I didn't provide staff with organizational guidance, staff members would manage me through meetings, walk-ins, and desk-sides. I made time on my calendar for routine business to allow the staff access to me while also preserving time to observe unit training. The other lesson I learned in regard to time management is that the commander need only do what no one else can do. Commanders who are building slides or writing orders are not taking the time to think ahead. This also applies to field grade officers; they need to move beyond the nearest three to five terrain features when planning.

Finally, it is critical to sit in others' seats and understand their perspective on why they are asking for support, tasking your unit, or giving guidance. Higher headquarters, garrison, or adjacent units are not screwed up; just like you, they are doing the best they can to accomplish an incredibly difficult mission. It is the commander's job to ensure that staff and leaders understand that they are part of a team.

Although not an exhaustive list, these are some of my most important lessons learned from battalion command. Many of these lessons may seem obvious. Other commanders may have a different list of lessons. However, the time it takes for some of these lessons learned to sink in may be underappreciated.

I would like to thank all of the outstanding Soldiers, leaders, and Families that I worked with and learned from during the two great years that I spent in the 2ID and ROK.

Endnotes:

[1]Title 10, U.S. Code, Subtitle A, Part II, Chapter 47, *Uniform Code of Military Justice*, <http://www.ucmj.us/>, accessed on 10 April 2017.

[2]AR 350-1, *Army Training and Leader Development*, 19 August 2014.

Lieutenant Colonel Hilburgh is the G-3, 20th CBRNE Command, Aberdeen Proving Ground, Maryland. He is a Ph.D. candidate from the University of Kansas and holds master's degrees from the School of Advanced Military Studies, the Naval War College, and Webster University.



ECBC: 100 Years of Protecting the American Soldier

By Dr. Brian B. Feeney

This article recounts the 100-year history of the U.S. Army Edgewood Chemical Biological Center (ECBC). It highlights the technological breakthroughs in protecting the warfighter and the Nation from chemical and biological threats over those 100 years. These breakthroughs fall into three categories: detection, protection, and decontamination. From its earliest days of using bleach and cotton pads to protect doughboys from the new threat of chemical warfare to its current work spanning digital technology, nanotechnology, and synthetic biology, this is a story of continuous improvements through the use of the world's best science and technology. This article also discusses the origins of ECBC and its readiness to respond to new threats moving forward into the next 100 years.

While ECBC is widely known to be the Nation's principal research and development resource for nonmedical chemical-biological defense, its rich history, which stretches back to World War I, is less well known. ECBC has played a role in every major American conflict since World War I, and its growth and evolution is the story of the Nation's Chemical-Biological Defense Program journey from a lesser player on the European periphery to a world leader. Today, the U.S. Chemical-Biological Defense Program is the envy of the world.

On 6 April 1917, the United States declared war on Germany and quickly moved to develop offensive and defensive chemical weapon capabilities. In October, under the Urgency Efficiency Act of 1917, President Woodrow Wilson issued a proclamation designating Gunpowder Neck in Harford County, Maryland, as the location of the Nation's primary chemical shell-filling plant known as the Gunpowder Reservation.[1] In December, the Army Ordnance Department authorized the construction of a chemical agent production plant to supply the shell-filling plant. Its location along the banks of the Gunpowder River, which flows into the Chesapeake Bay and eventually to the Atlantic Ocean, meant that supply munitions could travel directly to the U.S. Army in Europe during World War I.

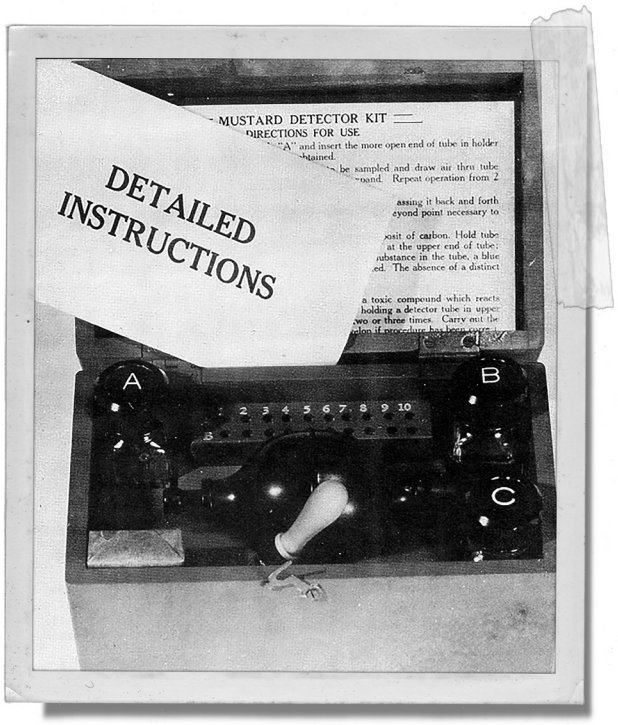
Meanwhile, the exhausted armies of Europe had been waging war for nearly 4 years, and chemical agents were a grim fact of daily life for these soldiers. Poison gas was probably the most feared weapon on the battlefield.[2] The U.S. Army sent its expeditionary force to Europe that year with the best offensive and defensive chemical capabilities available at the time.

Detection

World War I

During World War I, the U.S. Army possessed no technology for remotely sensing chemical agents and, therefore, it relied on human gas scouts. Gas scouts were positioned just beyond the main trench line, and if they smelled the garlic scent of mustard gas or felt the nasal and throat irritation of chlorine, they ran back and warned the other Soldiers. After a chemical agent attack, Soldiers determined if the agent had dispersed by taking off their masks and performing a "sniff test."[3] Recognizing the danger of using Soldiers as "canaries in the coal mine," Army researchers experimented with animals, including dogs, pigeons, and canaries. They even tried using snails and slugs, believing that by observing the waving of their tentacles, their slime production, and their movements, the snails would indicate the type of agent used and provide a rough indication of its concentration.

As the war progressed, ECBC (then called the U.S. Army Chemical Warfare Service Research Division) tested several concepts for a vapor field detector. The copper flame test lantern, which burned a green flame in the presence of copper and a blue-green flame in the presence of mustard gas, was perhaps the best prospect. However, it did not prove sensitive or reliable enough to dependably detect the presence of mustard gas, the biggest threat to Soldiers, because the effects took hours to be revealed.



More than 41,000 M4 detection kits were assembled during World War II.

Interwar Years and World War II

In 1934, ECBC (then called the Chemical Warfare Service) released a requirement for a chemical agent detector that would, above all, detect mustard gas. The requirement was not met until 1942 with the M4 Vapor Detector Kit. It used an early form of colorimetrics, by which tubes containing silica gel impregnated with a reagent would turn blue in the presence of mustard gas. It was later replaced by the improved M9 Chemical Agent Detector Kit. Also using colorimetric tubes, it only weighed 2 pounds and could be used to identify 11 different agents. However, like the M4, it could not detect nerve agents.

The next marked improvement in chemical agent detection was the M18 Chemical Agent Detection Kit, which was first produced in 1957. It used the same colorimetric technology but could detect nerve agents, and it weighed less.

Middle East Wars

The 1967 Arab–Israeli War demonstrated the need for combining chemical agent detection in the field with an alarm system that would warn Soldiers of a surprise chemical attack. In 1968, ECBC (then known as the Edgewood Arsenal Research Laboratories) combined the M43, a more advanced colorimetric detector, with the M42 alarm unit, creating the M8 Automatic Chemical Agent Alarm, a detector alarm system weighing 10 pounds. The combined unit could detect almost all known chemical agents. With minor adaptations, it could be configured for hand-held field use, mounted on trucks, or mounted on armored vehicles. It was a mainstay of the Army chemical agent defense until 1996.

The 1990s to Today

During the 1990s, ECBC (then known as the Edgewood Research, Development, and Engineering Center) made great strides in remote chemical agent detection. ECBC standardized and fielded the Improved Chemical Agent Monitor (ICAM). It was more reliable, more easily maintained, and more versatile than its Desert Storm predecessor. It could be programmed to test for expected threats, and it was sensitive enough to use for monitoring decontamination efforts.

In the 2000s, ECBC developed and fielded the M4 Joint Chemical Agent Detector (JCAD). It is capable of detecting nerve, blister, and blood agents and toxic industrial compounds. The JCAD is small, light, rugged, and highly portable. Because of these features, it quickly replaced the ICAM for field use. It has been produced in large quantities and fielded across the armed Services as a personal chemical agent detector.

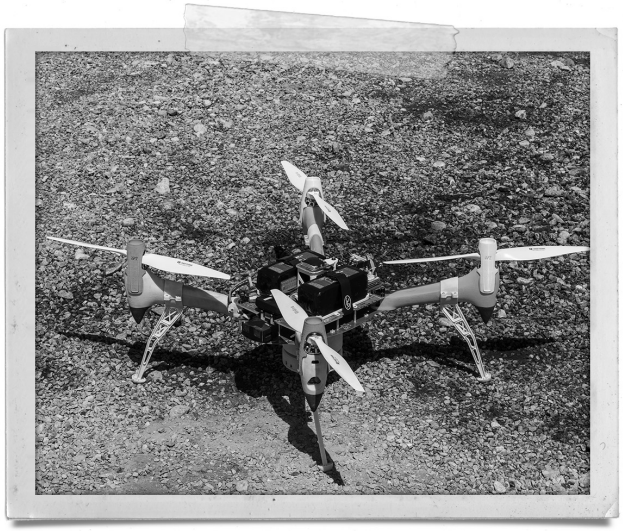


The JCAD proved to be a revolution in miniaturizing chemical agent detection technology.

Looking Forward

ECBC scientists and engineers continue to extend the boundaries of chemical detection to make the equipment faster, lighter, less expensive, and more reliable. Currently, ECBC is developing new methods to send detection instrument data to smartphones held by Soldiers standing at safe locations. The Soldier could then send the results to the unit commander, allowing hot zones to be quickly marked and communicated to other units.

ECBC is also developing on-the-move detection at speeds of up to 30 mph, which would allow a vehicle to remotely detect a chemical on the ground that could not be seen by the naked eye. Finally, ECBC is developing a new generation of drone technology that allows unmanned aerial and ground vehicles carrying detection equipment to intercept chemical agent clouds, identify the type of agent, and electronically send the data back to an integrated mission command center.



Deep Purple is a sensor-carrying aerial drone that ECBC developed to intercept and identify chemical and biological threats.

Protection

World War I

After the Germans first used chlorine gas as a chemical weapon in early World War I, Allies responded by issuing cotton pads that soldiers needed to soak in urine—the urea in urine reacted with chlorine. Soon, the mainstay of respiratory protection for American Soldiers during World War I became the Richardson Floy Kops Mask. It was an improved version of a British mask in wide use. The face piece consisted of cotton fabric coated with rubber. The canister was smaller than the British version, causing less breathing resistance. In addition to being more comfortable than the British mask, the Richardson Floy Kops Mask was also much easier to manufacture. Approximately 3 million Richardson Floy Kops Masks were produced during World War I.



The Richarson Floy Kops mask was the mainstay for U.S. Expeditionary Forces respiratory protection during World War I.

Interwar Years

In 1939, as war was breaking out on the continent, ECBC created the M2 service mask. This mask was a lightweight training mask with a fully molded rubber face piece. It proved successful in training, so it became the standard mask for the Army. Although this model ceased to be used in 1949, the face piece from the M2 service mask continued in use for special purposes.

Post-War Years

The M9 series mask was developed in 1947. It came with a light carrying bag, a face piece made of synthetic-molded rubber, and a breathing canister on the right or left side. More than 3 million of these masks were made between 1947 and 1959. It was replaced by the M17 series mask in 1959. The M17 included filter material in the cheek pockets of the mask rather than a side canister, which could pull the mask away from the face. The M17 series masks were the first to have a large, flexible, wrap-around lens. This provided greater visibility than earlier masks. It had front and side voicemitters and a drinking device. It was designed to allow for rapid donning, and it came in three sizes. However, due to marring of the lens and other problems, the M17 series was discontinued in the 1980s. In all, approximately 3.3 million M17 masks were produced between 1967 and 1986.

The Army replaced the M17 with the M40 mask in 1987. The face piece of this mask was made of silicone rubber. There were many improvements, including better vision, increased comfort, and easier maintenance. Later models



A Soldier wears an M50 protective mask with night vision goggles.

included a quick-doff hood to improve liquid resistance. The mask was first used during Operation Desert Storm, but was more widely used in 2003 during Operation Iraqi Freedom.

21st Century

The M50 Joint Service General-Purpose Mask, the first mask of the 21st century, replaced the M40 mask. The M50 Joint Service General-Purpose Mask was first field tested in 2001 and was standardized in 2007. It has a wrap-around visor, a silicon butyl blend face piece, and an upgraded valve design, which makes breathing 50 percent easier than with its predecessor. The M50 gives more vision range, has dual filters that are interchangeable, and can stay in toxic environments for longer periods.

The Future

ECBC has developed technologies for the next-generation mask, which is under development. Researchers are working to make the mask lighter and less bulky. The new design will feature upgrades that allow a flow of air into the nose cup and eye cavity of the mask to keep users cooler. Researchers are also developing physiological monitors and sensors that will control fan speeds based on the breathing demands of the user. Finally, the most advanced communications technology will be integrated into the mask.

Decontamination

World War I

Bleach was considered the best method of decontamination for Soldiers and their equipment during World War I. Other measures Allied armies used in the trenches included airing out contaminated clothing and equipment for 48 hours. Trench fans were also popular until Soldiers discovered that they were spreading chemical agents, not removing them. A long, hot shower was another popular method of decontamination, especially in the case of mustard gas, where there was some delay between exposure and blistering.

By the end of the war, the Allies had advanced to the point of assigning two 2-truck degassing units to each division. One 5-ton truck had a 1,200-gallon water tank, complete with heaters and piping to connect to portable showers, and the other 5-ton truck held extra uniforms. While their size and weight limited their ability to reach Soldiers in the trenches, it marked the high point of the Allies' organized response to the need for chemical agent decontamination.

The Interwar Years

Between the wars, the Army regarded bleach as the decontaminant of choice. Through research and development, ECBC (then known as the Technical Division at Edgewood) improved storage life of bleach and established specifications for three different grades of decontamination. They created Grade A bleaching material, or high-test bleach, for use in the tropics where existing bleaches could only be stored for 3 weeks. However, it was expensive to produce because it contained 70 percent available chlorine. Grade B bleaching material contained 35 percent available chlorine; and it was cheap, effective, and commercially available. Grade C bleaching material contained 30 percent available chlorine. The Grade C designation was often simply used as a designation for Grade B bleaching material after it started to deteriorate.

Another area of research and development using chlorine-based compounds was a dry decontamination powder mixed



A two-truck degassing unit, one of two assigned to each U.S. Army division during World War I

with the industrial solvent acetylene tetrachloride. Like other chlorine bleaches, it operated by liberating chlorine atoms from the agent but was slower acting. In the event of a mustard gas incident, this had the advantage of reducing the corrosiveness of the process, which could rapidly corrode any metal being decontaminated. Later improvements to this class of decontaminant, called decontaminating agent, noncorrosive (DANC), rendered the compound less likely to clog hose lines. It was also less expensive and had a longer shelf life. While very effective against mustard gas, it had no effect on nerve agents. Decontamination powder had been applied using buckets, shovels, and brooms, but during this period, ECBC developed a sprayer. The earliest versions of the sprayer consisted of a 10-gallon pressure tank and a spray hose. Air for pressurization came from an external source. When this method failed to meet the needs of the Army, ECBC turned to commercially available, hand-held insecticide sprayers. At 72 pounds, these sprayers could decontaminate 50 square yards. They were ready for use in World War II and the Korean War if needed.

World War II

The United States entered World War II fully prepared to counter chemical attacks if necessary. As part of this effort, ECBC standardized improved grades of chlorine-based decontamination compounds by adopting improvements made by British researchers between the wars. Also during this period, ECBC (then named the Chemical Warfare Center) developed skin ointments that were of some value for protection against mustard gas. Distributed in 0.75-ounce tubes, the M5 vesicant agent protective ointment was part of Army medical kits until 1969.

Postwar Period

In 1950, ECBC developed an improved bleaching powder called Super Tropical Bleach. It was essentially Grade C bleaching material with the addition of calcium oxide, which operated as a stabilizer. This increased the storage life and made the consistency more uniform; thus, it was easier to spread over a surface. The most important benefit was that it was effective against lewisite, G- and V-series nerve agents, and biological agents. Although too expensive for private industry to produce, the U.S. Army produced it at a plant in Pine Bluff, Arkansas, and it remained the Army's mainstay decontaminant for decades.

During this period, ECBC steadily upgraded its decontamination sprayer trucks by switching from wood to steel tanks; enlarging the tanks; increasing the water pressure; and adding spray guns, shower rails, and a water heater. This culminated in the M9 Decontamination Apparatus, which remained in use into the 1970s.

In 1960, ECBC (then called the Chemical Research and Development Laboratories) reformulated DANC and called it DANC 2. It was effective against all known chemical agents, including G- and V-series nerve agents, mustard gas, and biological agents. The new formulation was also far less corrosive to metals, rubber compounds, plastics, and fabrics. Despite being a skin irritant and corrosive to painted surfaces, DANC 2 was available in 1.33-quart and 5-gallon cans and remained a much-used decontaminant into the 21st century.

In 1966, ECBC (then known as the Research Laboratories) developed a skid-mounted version of the M9 Decontamination Apparatus. It could spray hot, soapy water or decontamination compounds. The field shower assembly was expanded to handle up to 25 Soldiers at a time. It remained in use throughout Operation Desert Storm.

In 1983, ECBC (then known as the Chemical Research and Development Center) developed a highly portable means of applying DANC 2. At 60 pounds, the M13 Decontamination Apparatus consisted of a 3.7-gallon tank with a spray nozzle that could be stored in a vehicle can-mounting bracket. It even included a scrubber brush to remove mud or soil from equipment that was being decontaminated.

Post 9/11 Era

After anthrax-laced letters were mailed to public buildings in 2001, policy makers felt an acute need for a highly compact, easy-to-use agent decontamination system. ECBC (officially named the Edgewood Chemical Biological Center at this point) developed the M100 Sorbent Decontamination System in response. It consisted of two packs of a nontoxic, noncorrosive decontaminant powder and two wash mitt applicators. It required no water and could easily be carried in a rucksack. The powder, unlike DANC 2, did not interfere with chemical agent detectors.

ECBC also developed a prepackaged, ready-to-go response kit for chemical and biological agent mass casualty incident response called the Mass Casualty Decontamination System. It consists of detection equipment, personal protection equipment, tents, decontamination and clean-up equipment, communications gear, hazmat reference guides, cameras, power, and lighting. Using a modular design concept, these sets are stored in industry standard containers with interiors that ECBC customized to precisely match the storage requirements of each specific equipment ensemble.

The Future

For the past 10 years, ECBC has steadily refined and improved a recently developed class of chemical compounds known as metal organic frameworks (MOFs). Chemists custom make MOFs in a laboratory using organic struts and metallic nodes, much like using an erector set, creating void spaces for chemical warfare agents or toxic industrial compound molecules to enter and get trapped.

MOFs have the dynamic quality of interacting with molecules that come into contact with them, and newer versions can neutralize chemical agents on contact. ECBC is now working to turn these molecules into a decontamination powder that can be used to neutralize chemical agents found in the field. The agency is even working on an MOF aerosol that can be sprayed on agent-exposed surfaces, such as that of an armored personnel carrier.

The best time to perform decontamination is as the contaminant comes into contact with a Soldier. ECBC is

(Continued on page 28)

Understanding Decontamination: Redox Reactions, Ad Hoc Decontamination, and Nanotechnology

By Specialist Michael K. Forlife

Throughout the training of a chemical, biological, radiological, and nuclear (CBRN) Soldier, there is an important and necessary focus on the execution of proper protocols, procedures, and guidelines in CBRN defense, first response, and prevention. These protocols ensure the effectiveness of a trained Soldier, regardless of individual abilities or limitations so long as they meet the standard and enable mission success. Yet, there is worth in introducing the concept of decontamination as a science early in a Soldier's career in order to broaden and spark the minds of future CBRN Soldiers. By understanding the mechanics of decontamination, CBRN Soldiers gain insight into the function of CBRN equipment and decontaminants. In turn, this knowledge gives CBRN Soldiers perspective on how to advance with the resources that they have and not be limited by those that they do not.

Redox Reactions

Decontamination primarily involves neutralizing or removing a hazardous or toxic substance. While there are many ways to accomplish this chemically, one of the most effective chemical reactions is that of reduction and oxidation (redox). Redox functions through the addition and removal of electrons between atoms. This can change the state of atoms and transform their chemical properties. Redox reactions occur throughout the natural world around us. Substances that have been proven to cause these reactions are known as reducing agents and oxidizing agents. When used in targeted situations, with specified results for the purpose of decontamination, these substances are also known as decontaminants.

Ad Hoc Decontamination

There are many ways in which decontamination reactions can occur and various methods with which we can catalyze them. With a sufficient understanding of the appropriate reactions to neutralize different classes of chemicals and a substantial knowledge of the chemistry of readily available (household) materials, it is possible to conduct emergency decontamination using limited resources with more effectiveness than a water, or soapy water, rinse alone. In some cases, this may even be more beneficial than the use of a caustic decontaminant like super tropical bleach. The need for ad hoc decontamination becomes prevalent when considering the case of an isolated unit with limited resources. A CBRN Soldier with the capability of ad hoc decontamination becomes essential to the unit as a skilled professional and enhances effectiveness in special operations, emergency response, and unit resourcefulness.

Moving past individual Soldier development, proactively training at least one Soldier in each CBRN company with a curriculum of ad hoc decontamination would solidify unit versatility and increase its scope in maneuver support. This would extend to humanitarian aid in the case of affected civilian populations that require emergency decontamination when insufficient resources are present. Material guidelines on self-decontamination using ad hoc decontaminants can be drafted on-site and disseminated to local populations in high-threat level environments.

The harnessing of these processes forms the foundation of the Chemical Corps mission. The same atoms arranged differently can have radically altered properties. For example, hydrogen, carbon, and nitrogen, which are all relatively harmless elements on their own, exist in many nontoxic molecules. But when these elements are bound in a specific arrangement, they form the highly toxic compound hydrogen cyanide. The difference between a toxic compound and a harmless compound can be determined simply by molecular geometry and interactions with the reference organism.

Nanotechnology

Designing specialized substances for the purpose of a desired response is the technological aspect of decontaminant production. Surface area, chemical kinetics, and atomic properties are among the many key factors that define the reaction rates and outcomes of decontamination reactions. In order to pursue the optimization of these factors, we must look to the nanoscale—the particle size range between 1 nanometer (a billionth of a meter) and 100 nanometers.

At this scale, decontaminants can be engineered to perform beyond their conventional form by modifying properties at their root.

A substance that can operate at this smaller scale affects a larger surface area than substances that operate at larger scales. Additionally, nanoscale properties may produce emergent phenomena that expand beyond existing macroscale properties. Nanoparticles have been implemented in environmental remediation and already exist in currently manufactured decontaminants. Nanoparticles can be engineered for specific functions, and they will be increasingly important to our craft as they are applied to decontamination requirements. As hazmat professionals, when moving forward with technology, we must also be cognizant of reactivity, ecosystem toxicity, and environmental fate. This is especially true with nanotechnology.

Conclusion

An understanding of decontamination is necessary to grasp the scope of a decontamination operation and its consequences as well as to visualize the Chemical Corps potential in proactive CBRN response, unit readiness, and urban operations. There should be a brief explanation of decontamination as a science early in a CBRN Soldier's career. We should be interested in the capability of conducting ad hoc decontamination with limited resources in remote locations. As a Corps, we are capable of engineering decontaminants at the nanoscale to suit our needs and beyond. While much of this is being driven by our civilian counterparts, there is more that we can do. Building scientific intrigue can pave a path for self-development and progression, which CBRN Soldiers require. CBRN Soldiers should be aware of these endeavors, and CBRN commanders should be capable of them or determined to pursue them.

Specialist Forlife is currently serving in the 95th CBRN Company at Joint Base Elmendorf–Richardson, Alaska. He holds a bachelor's degree in anthropology (with minors in psychology and philosophy) from Queens College, New York, and is completing a master's degree in environmental engineering and science at Johns Hopkins University, Maryland. He is enrolled in the applied physics program at Johns Hopkins University and set to begin his second master's degree this fall.



("ECBC: 100 Years of Protecting the American Soldier," continued from page 26)

currently designing and testing new fabrics in an effort to develop a self-detoxifying protective suit to replace current protective suits. This research also includes cutting-edge work on embedding suit fibers with MOFs so that chemical agents will be trapped, immobilized, and neutralized on contact, making decontamination of the suit unnecessary. Current research efforts include layering MOFs into the fabric as it is woven and grown on the fabric.

The Next 100 Years

In recognizing its 100-year anniversary, ECBC leaders wish to pay tribute to the excellence and dedication of generations of scientists, engineers, technicians, and administrative support personnel. Together, they have safeguarded the Nation through a century of tumultuous events and unprecedented challenges. Today's ECBC advancements are built upon the accomplishments of this past.

The future of ECBC is even more exciting. ECBC constantly retools to meet the next generation of chemical and biological challenges confronting the world. In the second decade of the 21st century, these challenges include emerging chemical and biological compounds, asymmetrical warfare in the far corners of the world, drones on and over the battlefield, and nonstate actors seeking opportunities to attack the homeland. ECBC will do its part to make the Nation ready for any and all of these contingencies.

Endnotes:

[1]Jeffery Smart, "From Plowshare to Sword: Historical Highlights of Gunpowder Neck and Edgewood Arsenal to the End of World War I," *Harford Historical Bulletin*, Number 63, Winter 1995, pp. 12–15.

[2]C. N. Trueman, "Gas Attack in World War One," History Learning Site, 31 March 2015, <http://www.historylearningsite.co.uk/world-war-one/the-western-front-in-world-war-one/gas-attack-in-world-war-one/>, accessed on 23 March 2017.

[3]J. K. Smart (Research, Development, and Engineering Command historian), personal interview, July 2009.

Dr. Feeney is a contractor supporting the ECBC Public Affairs Office. He holds a bachelor's degree in history from Colorado College, Colorado Springs; a master's degree in risk communication from Cornell University, Ithaca, New York; and a Ph.D. in risk communication from Temple University, Philadelphia, Pennsylvania.

NATO Exercise CRNA GORA–2016

By Lieutenant Colonel Jeremy J. DiGioia

"Every year, nations come together from across the alliance and from around the world, not to learn how to fight but to learn how to work together in the face of catastrophe, to put theory into practice, and to save people's lives."

—Jens Stoltenberg, NATO Secretary General[1]

Background

The Euro-Atlantic Disaster Response Coordinate Centre (EADRCC) is the primary civil emergency response mechanism within the North Atlantic Treaty Organization (NATO), and it functions as the 24-hours-a-day, 7-days-a-week entity for coordinating requests and offers of assistance when responding to natural and man-made disasters. In accordance with NATO's Civil Emergency Planning Exercise Policy, the EADRCC conducts an annual full-scale consequence management command post and field training exercise, CRNA GORA, in cooperation with a host nation lead agency.[2] The host nation for the 2016 exercise was Montenegro, and the lead agency was the Ministry of the Interior of Montenegro. A total of 31 NATO allied and partner nations sent more than 700 participants to the week-long exercise that took place in and around the capital city, Podgorica, from 31 October to 4 November 2016. Three chemical, biological, radiological, and nuclear (CBRN) subject matter experts from the CBRN Operational Engagements Branch, Defense Threat Reduction Agency, participated in the exercise and were responsible for developing and constructing the CBRN training venues for the many CBRN response teams participating in the exercise.

The joint exercise lifecycle for CRNA GORA–2016 was reduced; the Emergency Management Agency of Montenegro hosted two formal planning conferences and a site survey over the span of 8 months to design and coordinate an event that consisted of 2 days of academics and training, 2 days of command post and field training exercises, and a very important persons capabilities and demonstration day. To capture lessons identified during the exercise and formally conclude the joint exercise lifecycle, the NATO Centre of Excellence for Crisis Management and Disaster Relief, Sofia, Bulgaria, hosted a lessons identified conference in late January 2017. The conference results have been incorporated into next year's exercise planning cycle to develop and execute a better overall event for participating nations.

Exercise Objectives

The overall aim of CRNA GORA–2016 was to improve international cooperation and contribute to the civil emergency planning capabilities of NATO allies and partner nations. NATO also established nine auxiliary exercise objectives, ranging from facilitating cross-border transportation to practicing internationally agreed-upon guidelines—all of which were practiced during the exercise.

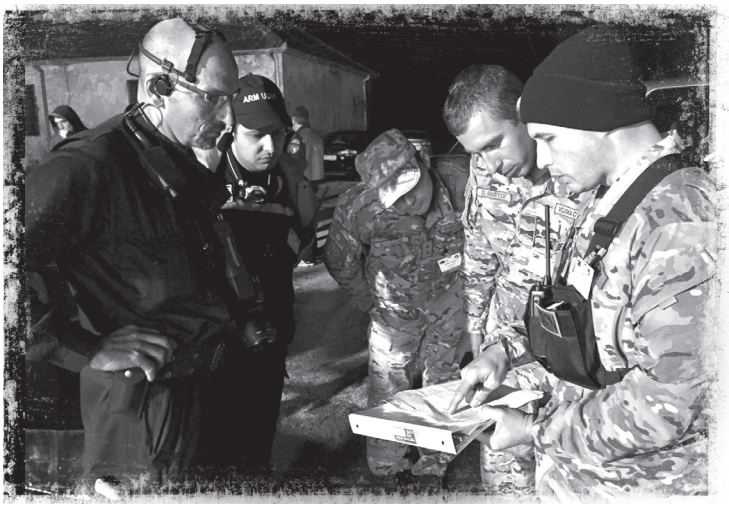


A joint U.S. and Armenian reconnaissance and survey team conducts site characterization activities.

There were also considerable geopolitical implications to the exercise, as NATO formally invited Montenegro to join the alliance in December 2015. Although it will still take the 28 member states approximately 18 months to ratify the accession accord, the exercise served as a reinforcing message to the small Balkan nation and successfully strengthened Montenegro's ability to receive international assistance, effectively organize for emergency response activities, and coordinate consequence management operations involving international response teams.

Training Activities

Before the field training portion of the exercise, the NATO Civil Protection Group invited all CBRN professionals to participate in a 2-day, on-site theoretical and practical training session. The theoretical portion of this training was classroom-based and provided basic instruction on interoperability and multiagency coordination during CBRN response operations, while the practical training portion was conducted in the field and provided an opportunity for international teams to practice hot-zone management tactics, techniques, and procedures in a multinational environment. Because CRNA GORA–2016 was an international exercise and the mandates of first responders involved in emergency response may be formulated in substantially different ways from one nation to another, NATO routinely uses the *Minimum Standards and Non-Binding Guidelines for First Responders Regarding Planning, Training, Procedure, and Equipment for Chemical, Biological, Radiological, and Nuclear (CBRN) Incidents* as the foundation for such training sessions.[3] These guidelines outline a basic starting point and training curriculum for international CBRN incident response and assist NATO in ensuring that all international response assets are capable of executing common CBRN tasks.



A survey team leader assigned to the 773d Civil Support Team conducts on-site coordination with the Montenegrin incident commander and Spanish decontamination team leader before entering a clandestine laboratory.

Exercise Management

Large-scale consequence and disaster response actions rely heavily on the voluntary contributions of many governmental and nongovernmental organizations. The EADRCC uses the United Nations On-Site Operation Coordination Centre (OSOCC) construct to rapidly employ these assets once available. The OSOCC "was developed as a rapid response tool that works in close cooperation with the affected government to provide a system for coordinating and facilitating the activities of international relief efforts at the site of a disaster."[4] The OSOCC construct is also convenient for exporting during exercises, and the EADRCC routinely does so.

When employed, the OSOCC immediately establishes coordination lines with the affected nation's government, host nation local emergency management authority, and a myriad of international rescue and relief teams. This rapid communication serves as a conduit between all levels of response to ensure that proper assets are deployed to the right locations in the most efficient and timely manner possible.

The EADRCC adds another level of white-cell management by way of an exercise-directing staff (DISTAFF). The DISTAFF is a collection of international consequence management experts and serves to independently direct and control the exercise on behalf of the EADRCC. In accordance with an agreed-upon set of exercise objectives, the DISTAFF can adjust or intensify the exercise events, taking into account the types and skill sets of response assets. Select members of the DISTAFF also deploy forward to training venues to serve as the eyes and ears of the DISTAFF director. This practice allows the DISTAFF director to know exactly how a training venue is progressing and assists the OSOCC and local emergency management authority in deploying proper response assets.

Field Training Exercise Specifics

The CRNA GORA–2016 lead-in scenario was based on a real-world natural disaster very common throughout the Balkans: massive flooding. The floods of 2010, considered the "worst floods in history that forced thousands to abandon their homes and caused unprecedented damage to crops and property," remain a fresh memory for many Montenegrins.[5] Flooding is an annual threat with a potential for follow-on hazardous material-related effects, which made the inclusion of CBRN-themed training venues in the exercise a natural nexus.

In accordance with the exercise scenario, notional flooding quickly overwhelmed host nation response capabilities and, in turn, Montenegro requested international assistance through the EADRCC. The capabilities specifically requested were CBRN response teams, flood rescue boats, urban search and rescue assets, high-capacity pumping equipment, and flood containment systems support.

In order to challenge the CBRN response teams with realistic problem sets, the Defense Threat Reduction Agency team developed the following five CBRN-themed training venues:

- A clandestine laboratory with several CBRN targets, including a hazardous materials cache, ricin extraction facility, nicotine poison extraction facility, triacetone triperoxide process location, improvised mubtakkar hydrogen cyanide workshop, and rudimentary incubator.
- A mass casualty decontamination event with approximately 40 ambulatory and nonambulatory role players.
- A hazardous materials cache requiring CBRN and water rescue response assets.
- A hazardous materials cache requiring CBRN and urban search and rescue response assets.



Albanian soldiers process a casualty through the decontamination station.

- A water source contaminated with industrial hazardous materials.

Additionally, the 773d Civil Support Team, Kaiserslautern, Germany, provided an analytical laboratory system for the real-time analysis of the many samples collected by international CBRN reconnaissance and survey teams.



An Albanian mass casualty decontamination company prepares to receive contaminated casualties.

Eight nations (Albania, Armenia, Azerbaijan, Croatia, Georgia, Spain, Ukraine, and the United States) contributed CBRN response teams, all with different degrees of CBRN response capability specialties. In many instances, in an effort to promote and conduct international interoperability, CBRN response teams from one nation combined with those from another to field a fully-capable entity. For example, the first CBRN training venue was managed by a Montenegrin incident commander, but was executed by a joint U.S./Armenian reconnaissance and survey team and a Spanish technical decontamination team. The culminating event of the exercise was a mass casualty decontamination operation featuring an Albanian mass casualty decontamination team, a Macedonian post-decontamination medical support team, a U.S. civil support team, a Croatian remotely operated multifunctional robotic firefighting system (capable of deploying to hazardous or unknown environments), and a Montenegrin incident commander.

Conclusion

The EADRCC has facilitated a consequence management-themed exercise in a different host nation since 2004, and these exercises are a proven mechanism for improving civil preparedness among NATO allied and partner nations. CRNA GORA–2016 was an extremely successful exercise that met all of the EADRCC exercise objectives. NATO recently confirmed Bosnia and Herzegovina as the 2017 host nation, and the Defense Threat Reduction Agency will once again support the EADRCC in developing and executing a realistic and challenging international event.

Endnotes:

[1]"Remarks: by NATO Secretary General Jens Stoltenberg at the Opening Ceremony of the EADRCC Exercise 'Ukraine 2015,' " NATO Web site, 21 September 2015, <http://www.nato.int/cps/en/natohq/opinions_122738.htm>, accessed on 24 February 2017.

[2]"Civil Emergency Planning Exercise Policy," NATO Senior Civil Emergency Planning Committee, 11 October 2004.

[3]NATO Civil Emergency Planning, Civil Protection Group, *Minimum Standards and Non-Binding Guidelines for First Responders Regarding Planning, Training, Procedure, and Equipment for Chemical, Biological, Radiological, and Nuclear (CBRN) Incidents*, 1 August 2014.

[4]United Nations Office for the Coordination of Humanitarian Affairs, "On-Site Operations Coordination Centre (OSOCC) Guidelines 2014," Field Coordination Support Section, December 2014.

[5]Ministry for Human and Minority Rights, "Government of Montenegro Launches a Website for Flood Relief Donations," <http://www.mmp.gov.me/en/news/102339/Government-of-Montenegro-launches-a-website-for-flood-relief-donations.html>, accessed on 24 February 2017.

Lieutenant Colonel DiGioia is a CBRN military advisory team leader, Defense Threat Reduction Agency, Kleber Kaserne, Germany. He holds a bachelor's degree in communication sciences from Arizona State University, Tempe, Arizona, and a master's degree in environmental management from Webster University.

Dragon Civilians

By Ms. Karen Jolley Nikol

The U.S. Army Chemical Materials Activity (CMA), Aberdeen Proving Ground, Maryland, safely and effectively stores and destroys chemical weapons while preparing the public to take action during chemical emergencies and complying with the international Chemical Weapons Convention (CWC) treaty. The CWC, a treaty ratified by the United States in 1997 and implemented by the Organisation for the Prohibition of Chemical Weapons, requires destruction of all chemical weapons and former chemical weapon production facilities.

If you aren't from one of the U.S. chemical weapon stockpile communities or have never encountered recovered chemical warfare materiel, you may not be familiar with CMA. CMA develops, implements, manages, and provides direction for the safe and secure storage, assessment, and treatment of stockpiled and recovered chemical warfare materiel. "With CMA's continued success in eliminating chemical weapons, I'm proud not only of our exceptional safety record, but [also] the many technologies we [have] continue[d] to employ over the past 2 decades," said Colonel Nathaniel W. Farmer, CMA Director. "Our workforce is committed to our mission and ensuring [that] we set the standard for excellence in the chemical demilitarization community," he added.

The World is Watching

As the director of CMA, Farmer is the Army's designated implementing agent for the CWC. CMA milestones mandated by the treaty included the destruction of all former chemical agent production facilities and the destruction of 90 percent of the Nation's chemical weapon stockpile, to include all binary chemical weapons and components. While CMA met those milestones by the deadline, the environmental cleanup of military ranges and other disposal sites resulted in the discovery of additional chemical weapons.

The CMA Center for Treaty Implementation and Compliance manages CWC implementation for the director and ensures that implementation and compliance activities are in accordance with the CWC. The Center for Treaty Implementation and Compliance—

- Participates as part of the host team during inspections of chemical weapon storage and destruction sites.
- Prepares notifications for declaring recovered chemical warfare materiel.
- Provides notification for the start and end of destruction operations.
- Prepares reports and briefings to the Organisation for the Prohibition of Chemical Weapons on the status of chemical weapon destruction.
- Performs many other treaty-mandated obligations.

CMA ensures that the two remaining chemical stockpile storage sites (Pueblo Chemical Depot [PCD], Colorado, and Blue Grass Chemical Activity, Blue Grass Army Depot, Kentucky) can accomplish their mission to safely store chemical weapons and deliver them to destruction facilities.



The chemical weapons stockpile at PCD is stored in igloos until munitions are transported to the demilitarization plant for destruction.

PCD stores approximately 7 percent of the Nation's original chemical weapons stockpile. Encompassing 23,000 acres, PCD is responsible for storing 2,600 tons of mustard agent in approximately 780,000 munitions. The demilitarization plant for PCD began operations in September 2016.

The Blue Grass Chemical Activity manages the chemical weapons stockpile at Blue Grass Army Depot, located on 250 acres of the 15,000-acre depot. The storage mission, which represents about 2 percent of the original declared stockpile, includes 523 tons of nerve agents and mustard agents in projectiles, warheads, and rockets. The plant that will destroy those weapons is undergoing systemization, with initiation of plant operations forecast within a few years.



A worker at PCD inspects 155-millimeter mustard munitions in storage.

Mr. Steven Penrod, CMA Mission Operations Director, said that the staff takes the safe handling and storage of chemical weapons seriously. CMA ensures that chemical weapons remain safely protected and monitored pending treatment and works with local stakeholders to ensure that the community is informed and prepared for all storage activities, he explained. CMA also works with the Program Executive Office for Assembled Chemical Weapons Alternatives, which is responsible for the destruction of the final two chemical weapon stockpiles. CMA remains ready to ensure the safe delivery of stockpiled munitions to the demilitarization plants, as needed.

Public Protection is Crucial

CMA, in partnership with the Federal Emergency Management Agency, manages the Chemical Stockpile Emergency Preparedness Program (CSEPP) for the Army. CSEPP teams up with the states and communities surrounding the stockpile sites to provide emergency preparedness assistance and resources in the unlikely event of a chemical weapon accident or incident. Key partnerships between CSEPP and state and local emergency management officials enhance emergency management plans and provide response equipment and warning systems.

CSEPP initiatives include providing training and exercises for local, installation, tribal, state, and federal assets to ensure continued communication and mission readiness for its partners, emergency responders, and the stockpile community. The top priority of CMA remains sustained collaboration with key partners in the communities to ensure preparedness for any situation, which is one reason CMA has such an exceptional safety record, explained Farmer.

When Chemical Weapons are Recovered

As stockpile elimination becomes a reality, the CMA Recovered Chemical Materiel Directorate (RCMD) continues to respond to installations and formerly used defense burial sites around the country. RCMD manages the assessment and destruction of recovered chemical warfare materiel. Using unique mobile technologies, RCMD can assess recovered items to determine the chemical fill and to safely destroy items on location, if required.



A Blue Grass Army Depot police officer checks on a volunteer posing as a recovering casualty during a Chemical Accident or Incident Response and Assistance (CAIRA) exercise.

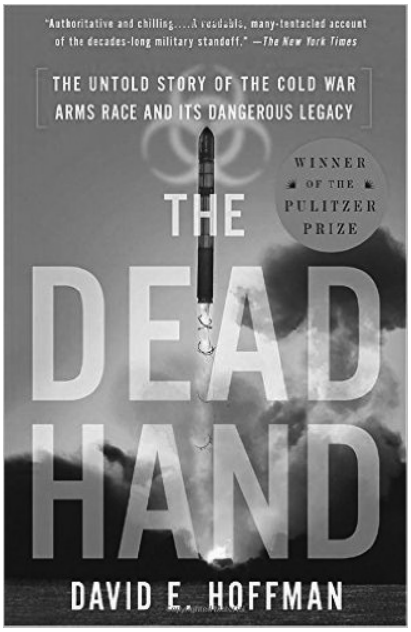
The team provides direction and support from item recovery to waste disposal, said RCMD Director, Mr. Laurence Gottschalk, who has more than 32 years of experience in the chemical demilitarization field. This capability will be required by the United States for a long time, he explained.



A mock chemical agent exposure victim undergoes decontamination procedures during a CAIRA exercise at the Blue Grass Chemical Activity, Blue Grass Army Depot.

When an item with an unknown fill is discovered, RCMD deploys the Mobile Munitions Assessment System to the location of the recovered item. The Mobile Munitions Assessment System transports three proven, nonintrusive assessment technologies to determine, without having to open the containment shell, whether an item is explosively configured

(Continued on page 36)



Book Review of *The Dead Hand: The Untold Story of the Cold War Arms Race and Its Dangerous Legacy*

Reviewed by Captain Heidi D. Beemer

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

The Dead Hand: The Untold Story of the Cold War Arms Race and Its Dangerous Legacy, by David E. Hoffman, investigates the nuclear, biological, and chemical warfare programs of the Soviet Union. This review outlines the author's desired effect for writing this book, provides criticism of Hoffman's argument, and describes the value this book provides to the chemical, biological, radiological, and nuclear (CBRN) warfighter.

Hoffman's objective in writing *The Dead Hand: The Untold Story of the Cold War Arms Race and Its Dangerous Legacy* is to describe the international situation between the United States and the Soviet Union on the brink of world war. He provides a comprehensive view of what caused the confrontation between these two countries, focusing on the interactions between U.S. President Ronald W. Reagan and Soviet Union President Mikhail S. Gorbachev in the 1980s. He brings attention to the modern CBRN threat, focusing on the Soviet Union nuclear, biological, and chemical weapons programs, most of which were shrouded in secrecy from the Soviet people and the rest of the world. He makes it clear that Soviet leaders were not capable of suppressing their craving for catastrophe-inducing weapons of mass destruction (WMD) as a means of maintaining world dominance. The author also demonstrates that the legacy of the Soviet Union is still virulent, alluding to the fact that loose nuclear material, deadly viruses, and chemical agents were present after the Soviet Union collapse; were not accounted for; and were poorly guarded or protected from opportunist criminal and terrorist groups.

Hoffman describes the effects of Reagan's Strategic Defense Initiative, also known as "Star Wars." This missile defense shield was the centerpiece of Reagan's nuclear defense initiative, and it posed a significant threat to the Soviet Union because of the sheer size and the cost of engineering a similar project.[1] Although Gorbachev's advisors presented him with an equivalent project, he leaned on the program called Perimeter, also known as "Dead Hand." Perimeter was a doomsday device that would automatically retaliate, with junior officers buried deep underground, launching missiles in the absence of the Soviet command structure.[2] This program helped to replace the concept of guaranteed destruction with the concept of guaranteed mutual destruction, which became a major symbol of the Cold War and this book.[3]

Hoffman also intends to explore the origin and expansion of the Soviet Union biological weapons program by giving detailed accounts of the inner workings of Biopreparat (the major biological warfare agency of the Soviet Union). Hoffman unfolds the Soviet state's secrets, proving that the Soviet Union ignored the Biological and Toxin Weapons Treaty signed in 1972.[4] The book not only highlights the effects that biological weapons would have in future wars, but it also emphasizes the risks that weapon manufacturing were to the unaware local Soviet population. Hoffman paints the picture of a 1979 government cover-up, which was the result of an anthrax release that killed hundreds of people working downwind from a Sverdlovsk research facility. The Russian government insisted that infectious meat caused the illness and that "the idea of some sort of aerosol was impossible."[5] Government officials lied to the public and repeated the lie more than 200 times to private and government scientists and inspectors. The author provides further evidence of the Soviets' hope to build a super-germ capable of creating a

mild illness that would facilitate dissemination, followed by a fatal attack. The program grew so large that even Gorbachev feared that the government had lost control of the biological program to military scientists and generals. Gorbachev was unable to admit how large the program really was or the scope of his country's violations of international treaties.[6]

Although Hoffman only dedicates a small portion of the book to chemical weapons, he portrays the Soviets' dedication to manufacturing and weaponizing all types of WMD. He describes chemical arsenals and stockpiles of sarin, soman, and nerve agent analogues spread throughout the country. Unlike biological weapons, Gorbachev was very open about his desire to rid his country of chemical weapons. The author describes Gorbachev's openness to international inspectors entering his country and his wish to stop further production of chemical weapons despite the technological breakthroughs the country had made in regard to designing binary style weapons containing Novichok generation nerve agents.[7]

The author also describes the most unnerving legacy of the Cold War—the remnants of the unchecked Soviet-era WMD. Internal control of nuclear material and biological and chemical weapons was nearly nonexistent after the regime fell.[8] As scientists who were heavily relied-upon lost their jobs and once-guarded production and weapon facilities remained unprotected across the country, a larger issue emerged. Scientists and stockpiles became prime targets for terrorist and criminal groups that threated the safety of not only the United States but also the entire world. The author describes nonproliferation efforts, including the bipartisan Nunn-Lugar Act, which led the United States to intervene in an attempt to keep these dangerous weapons out of the reach of criminal and nefarious groups.[9] Fear of "loose nukes" and enriched uranium and plutonium falling into the wrong hands resulted in the U.S. expenditure of millions of dollars and man hours to collect nuclear waste and material for storage and destruction. Russia had thousands of unemployed Soviet scientists with specific skills who became targets for exploitation to the highest bidder. The United States worked hard to properly deal with these threats by keeping these scientists employed and monitoring their movement around the world.[10]

Hoffman gives a detailed account of what occurred during and after the fall of the Soviet Union. The vast experience he attained while serving as a *Washington Post* special correspondent and the head of the Moscow Bureau during the Reagan administration allowed him to describe, at great lengths, the inner workings of both countries during this period.[11] There seems to be no doubt that the author, through his extensive interactions with the people described in this book, provided information and materials that depicted a profound understanding of this time in history. Hoffman obtained resources such as classified reports from Soviet defense bureaucrats, transcripts from secret meetings, memoirs and diaries from Soviet and American officials, and interviews from former leaders including Gorbachev.[12] Vitalii Katayev, who worked for the Committee of the Soviet Communist Party, provided Hoffman with tens of thousands of documents, records, and laboratory notes that he had taken describing the inner workings of the Soviet missile program.[13]

Although critics generally believe that Hoffman's account of this story is accurate, some suspect that the book contains some exaggeration.[14] One of the best things about this book is the author's ability to capture his audience. He puts the reader right in the action—in the control room during false alarm tracking of the Dead Hand and in the autopsy room while doctors discover black lesions and swollen lymph nodes that point to anthrax exposure. Although it does not seem intentional, the author's personal experience is evident within the material.[15] The author often bases his version of the story on personal accounts rather than on archived data. Many of his interviewees left Russia for a better life, which leaves room for exaggeration of their accounts. The Soviet Union culture also encouraged people to be misleading and to lie, which may have influenced their versions of the story.[16]

Although Hoffman weaves his emotional connection into his book, overall he hits home with his point. He guides his audience to the facts, and he describes the extensive WMD programs of the Soviet Union. He clearly demonstrates that the international community does not know how much of those programs remain today. It is also unclear how the collapse of the Soviet Union and the proliferation of weapons and material affect battlefields across the world today.

A much-diminished Russia emerged after the collapse of the Soviet Union. However, this new Russia is the outgrowth of the old Soviet state, and it inevitably carries with it parts of the old bureaucracy and elements of the old ways of doing business.[17] Although CBRN Soldiers are not the sole intended audience of this book, Hoffman does an exceptional job of outlining the nuclear, biological, and chemical threats of today, and he remains one of the only authors to do this within a single book. This is not the story of chemical weapons used in World War I or the effects the nuclear bomb had during World War II; this book describes the operational environment that CBRN Soldiers may face now. It is incumbent upon leaders to continue to learn about the operational environment that the Corps will face in future wars.

As global tensions continue to grow over conflicts in Syria, Iran, and North Korea, the U.S. Army may soon encounter the same effects described by the author regarding the fall of the Soviet Union. As intelligence communities continue to track the spread of WMD after the collapse of the Soviet Union, Military Occupational Specialty 74-series Soldiers must remain ready to defend the Nation and the nations of our allies in future conventional warfare and unconventional attacks. It is in our Corps' best interest to understand the capabilities of a nation to manufacture sophisticated weapons of terror and to understand what threats remain viable today. The best way to start this research would be to read Pulitzer Prize winner David E. Hoffman's *The Dead*

Hand: The Untold Story of the Cold War Arms Race and Its Dangerous Legacy to gain a better understanding of the complete CBRN threat.

Endnotes:

[1]Nicholas Daniloff, "Book Review: The Dead Hand: The Untold Story of the Cold War Arms Race and Its Dangerous Legacy," *Journal of Cold War Studies*, 2 March 2012, <http://www.mitpressjournals.org/doi/abs/10.1162/JCWS_r_00205#.WOUyODZMS70>, accessed on 5 April 2017.

[2]David E. Hoffman, *The Dead Hand: The Untold Story of the Cold War Arms Race and Its Dangerous Legacy*, Anchor Books, New York City, 2009, pp. 152–153.

[3]Vasily Lata, "On Both Sides of the Iron Curtain," *A Russian Journal on International Security*, 2012, p. 128.

[4]Hoffman, p. 20.

[5]Ibid., p. 307.

[6]Ibid., p. 302.

[7]Ibid., pp. 309–311.

[8]Mathew Dallek, "Book World, Review of The Dead Hand, by David E. Hoffman," *Washington Post*, 17 January 2010, <http://www.washingtonpost.com/wp-dyn/content/article/2010/01/15/AR2010011501387.html>, accessed on 5 April 2017.

[9]Dwight Garner, "Behind the Scenes of the Dark Cold War, Where an Even Darker Side Lurked," *New York Times*, 22 September 2009, <http://www.nytimes.com/2009/09/23/books/23garner.html>, accessed on 5 April 2017.

[10]Ibid.

[11]Lata, p. 127.

[12]Daniloff, p. 130.

[13]Ibid.

[14]Lata, p. 127.

[15]Ibid.

[16]Ibid.

[17]Daniloff, p. 132.

Reference:

Lawrence D. Freedman, "Capsule Review, The Dead Hand: The Untold Story of the Cold War Arms Race and Its Dangerous Legacy," *Foreign Affairs*, March/April 2010, <https://www.foreignaffairs.com/reviews/capsule-review/2010-03-01/dead-hand-untold-story-cold-war-arms-race-and-its-dangerous-legacy>, accessed on 5 April 2017.

Captain Beemer is the protection officer for the 1st Cavalry Division Resolute Support Sustainment Brigade, Bagram Airfield, Afghanistan. She will be taking command of the 181st Hazard Response Company in June 2017. She holds a bachelor's degree in chemistry from the Virginia Military Institute, Lexington, Virginia, and a master's degree in aeronautics from Embry-Riddle Aeronautical University–Worldwide.

("Dragon Civilians," continued from page 33)

or contains a chemical agent. The Digital Radiography and Computed Tomography System provides an X-ray of the item interior, the Portable Isotopic Neutron Spectroscopy System detects elements using neutron particles to identify the chemical contents, and the Raman Spectrometer uses a laser to identify chemical agents in glass bottles and vials.

Once the item contents are confirmed as chemical fill, RCMD works with the site to develop treatment plans, coordinate appropriate permits, and deploy the appropriate destruction technology. For chemical munitions, RCMD uses the Explosive Destruction System (EDS), a transportable system that explosively accesses chemical-filled items, then neutralizes the contents inside a sealed steel vessel. The 4- to 6-inch-thick stainless steel vessel contains all the blast, vapor, and fragments from the process. Residual liquid and air sampling from within the vessel confirms effective treatment.

In a recent example of CMA critical work at Joint Base McGuire–Dix—Lakehurst, Trenton, New Jersey, RCMD successfully destroyed two World War I-era chemical munitions—one containing mustard agent and the other containing phosgene. After months of planning and permit approval, the munitions were destroyed with the EDS.

"After explosively opening the munition, which destroys any energetics and exposes the agent, a chemical reaction within the vessel, combined with rotation and heat if necessary, neutralizes the chemical contents," Gottschalk said. "Upon treatment confirmation, the liquid neutralent drains from the system into 55-gallon drums for shipment to a licensed commercial waste treatment, storage, and disposal facility."

RCMD used an EDS to support the Pueblo Chemical Agent Destruction Pilot Plant at PCD to process rounds already in storage and, in the future, will use an EDS to process rounds that are rejected from the main processing plant. RCMD teams up with the 20th Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Command CBRNE Analytical and Remediation Activity for assessment missions. For EDS operations, RCMD works with the Edgewood Chemical Biological Center for support from trained, experienced operators.

Conclusion

With decades of combined chemical weapons remediation experience, CMA continues to seek opportunities and partial collaborations to enhance technologies and build on past successes to keep our Nation safe. For more information, visit <https://www.cma.army.mil>.

Ms. Nikol is the CMA public affairs officer supporting RCMD, CSEPP, and the stockpile sites. She has worked with the chemical weapon community as an Army public affairs specialist since the 1980s. She is an honor graduate of the University of Maryland College of Journalism, College Park.

Reactivate 21st Chemical Company Airborne Status



By Captain Eugene Ellis Jr. and First Lieutenant Trenton M. Gravely

The 21st Chemical Company (Airborne) was the only airborne chemical company in the U.S. Army. The company produced highly trained chemical paratroopers who were dedicated to the airborne and force protection missions in the 82d Airborne Division. The training environment was challenging due to the high operational tempo of the unit, which was maintaining airborne proficiency and providing chemical, biological, radiological, and nuclear (CBRN) capabilities to the force. The 21st Chemical Company sustained operational support to the 82d Airborne Division for 29 years. Due to the Army force restructure and reorganization, airborne status was terminated in 2008. The unit was reassigned to the 83d Chemical Battalion and later to the 2d Chemical Battalion. The purpose of this article is to encourage the reactivation of airborne status for the 21st Chemical Company in order to provide immediate force protection for the airborne community.

The 21st Chemical Company had provided smoke and decontamination support in the airborne community since September 1979. Chemical paratroopers are dynamic, adaptive and, most importantly, multifunctional paratroopers. The unit provided more than just CBRN technical competence; it was a force multiplier, specializing in joint forcible-entry operations to seize key terrain (such as airfields or other high-profile targets) behind enemy lines. Each platoon maintained a qualified jumpmaster team, which was rare at the platoon level in an airborne community. The 3d Platoon sergeant explained that the unit offered more than what was expected; paratroopers took pride in every mission, and every paratrooper assigned to the unit wanted to be a jumpmaster.

As a member of 2d Chemical Battalion, the company mission was revised to support the defense support of civil authorities to combat current and future CBRN threats within the United States. After the 11 September 2001 attacks, homeland defense became the focal point. This revision identifies two priority missions for homeland defense: defend U.S. territory from direct attack by state and nonstate actors and provide assistance to domestic civil authorities in the event of natural or man-made disasters, potentially in response to a very significant or catastrophic event.[1] According to the 3d Platoon sergeant, the company adjusted to the new role quickly; technical proficiency at consequence management, hazardous response, and other critical CBRN training increased—and the airborne community took notice. With the increase in CBRN global threats, the capabilities offered are relevant to the Army.

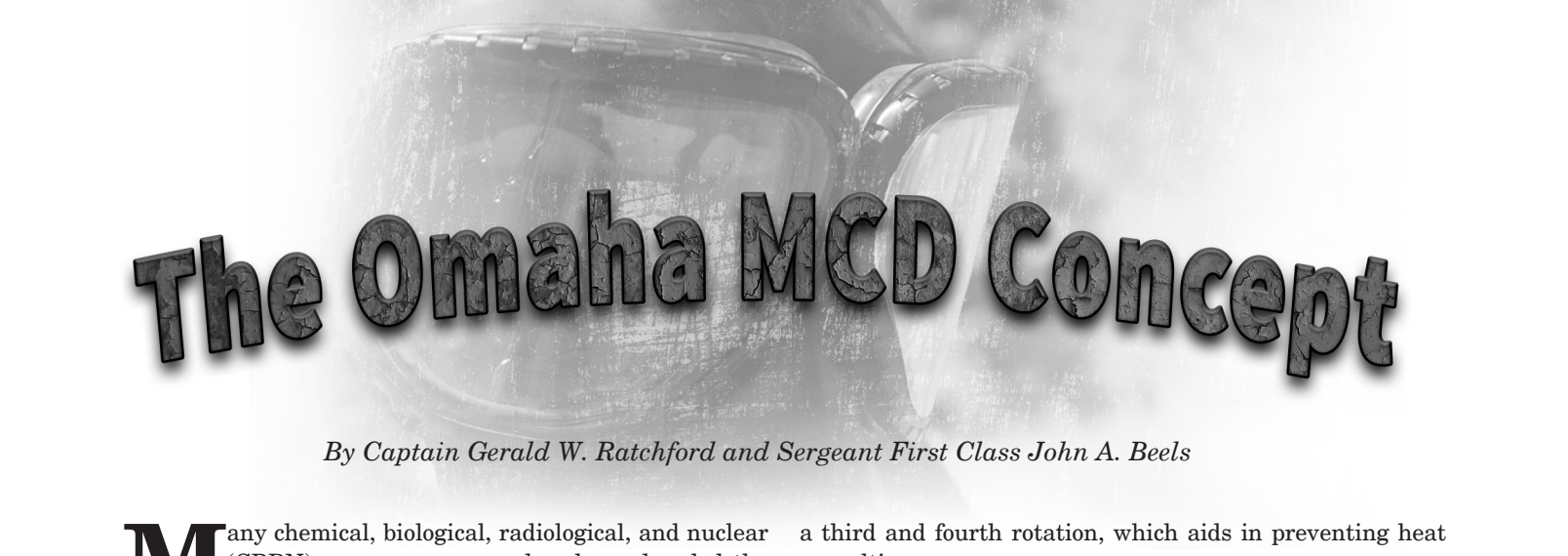
Subordinate units of the 20th Support Command, including the 21st Chemical Company, conducted joint training with the 82d Airborne Division to demonstrate CBRN capabilities in support of the maneuver unit global response force mission. While on airborne status, the company routinely supported the global response force mission. This is a task with which it was naturally comfortable; however, the delay in response time to support the airborne units on the ground was inefficient. The 21st Chemical Company arrived by air-lands after the objective was cleared, which reduced CBRN force protection capabilities. It is essential that the 21st Chemical Company be integrated with the maneuver force in the air and immediately on the ground in order to provide CBRN support. This will require airborne status reactivation of the 21st Chemical Company.

Endnote:

[1]Global Biodefense, "DOD Support to Civil Authorities for CBRN Homeland Defense," 25 March 2013, <http://globalbiodefense.com/2013/03/25/dod-support-to-civil-authorities-for-cbrn-homeland-defense/>, accessed on 1 March 2017.

Captain Ellis is the brigade CBRN officer for the 95th Civil Affairs Brigade (Airborne), Fort Bragg, North Carolina. He holds a bachelor's degree in history from Campbell University, Buies Creek, North Carolina.

First Lieutenant Gravely is the battalion operations officer for the 490th CBRN Battalion, Anniston, Alabama. He holds a bachelors of business administration in management from Francis Marion University, Florence, South Carolina.



The Omaha MCD Concept

By Captain Gerald W. Ratchford and Sergeant First Class John A. Beels

Many chemical, biological, radiological, and nuclear (CBRN) company commanders have dreaded the Defense Civil Response Force mission for years. This mission requires more than 100 percent of the manpower allocated by the modified table of organization and equipment, which has decreased with the recent force design update (FDU). This article describes a tested, proven, and more efficient way to accomplish the Defense Civil Response Force mission with half the manpower. It represents an essential decrease in required personnel because current mass casualty decontamination (MCD) guidance prescribes more personnel than a company at 100 percent strength can provide. This method, the Omaha MCD concept, allows accomplishment of the mission at the new FDU personnel levels.

As the name implies, the commander may need to call a football-like "audible" to accomplish the mission. The commander instructs an MCD line shift, from a prescribed doctrine configuration to an Omaha MCD configuration. Current guidelines suggest at least 100 CBRN Soldiers be divided into four rotations to sustain an MCD line for 12 hours; however, this number exceeds the new FDU personnel levels allocated to the modified table of organization and equipment. Furthermore, Soldiers who are unavailable due to medical or legal reasons must be accounted for. This could leave the average CBRN company with only 80 deployable Soldiers. The mission is further constrained by positions that require Soldiers to be out of suit, Soldiers who are unable to pass medical monitoring, and/or Soldiers who become casualties themselves. This results in a worst-case scenario of approximately 70 Soldiers available to complete the mission. The Omaha MCD configuration provides a reduced personnel burden and increases efficiency, only requiring 68 Soldiers divided into four shifts. This meets typical real-world numbers of deployable Soldiers available to a CBRN company to complete the mission.

The occurrence of a CBRN event is only a matter of time. Unfortunately, most CBRN company personnel levels are far below that suggested to complete the mission. A fully deployable CBRN company needs augmentees in order to sustain rotations. The Omaha MCD concept eliminates this need by cutting the ambulatory positions in half and closing the technical decontamination line until it is needed. Doffing is also conducted in the ambulatory line. This allows for a third and fourth rotation, which aids in preventing heat casualties.

The key enabler of the Omaha MCD configuration is the removal of the privacy barrier in the ambulatory decontamination tent. First and foremost, the notion of privacy should be dismissed during a mass casualty event; it results in a fundamental flaw in casualty processing times. Upon removal of the privacy barrier, the ambulatory line can process two casualties, with one Soldier at each station. However, two Soldiers remain at the monitoring station. The only addition is that the platoon leader or platoon sergeant of the ambulatory line assumes a management role between the casualty collection point (CCP) and the front of the undress tent. He or she receives the casualties from the CCP and guides them into the tent. This provides additional command and control to assist the ambulatory line Soldiers who are processing two casualties at once. In the event of unruly casualties, the platoon leader/platoon sergeant notifies the CCP to hold casualties and he or she steps into the tent to handle one casualty while the undress Soldier assists the other. If needed, the platoon leader/platoon sergeant assists the wash-and-rinse station Soldier until the unruly casualty has been decontaminated. Lastly, the technical decontamination line remains unmanned unless manning is necessary.

When a shift change is called, the ambulatory casualty processing adjusts to one casualty at a time, while the previous rotation Soldiers wash and rinse. They are monitored using the now-vacated lane. The platoon leader/platoon sergeant supervises this process. This cuts Soldier's doffing times considerably, while ambulatory casualties continue to process and space constraints on the nonambulatory line are reduced.

There are pros and cons to the doctrine guidelines and the Omaha MCD concept. But with proper planning and training, the drawbacks can be mitigated.

As previously described, modestly is a key issue. Men, women, and children are expected to remove all clothing in order to be decontaminated. Without the privacy barrier, genders are mixed. However, the survival of a casualty is more important than modesty. In response to criticism, U.S. Army North posed this question: "Would you want your 10-year-old daughter seen by a man while they are decontaminated?" The answer is a resounding yes—because the

removal of the privacy barrier increases the girl's chances of survival since she is decontaminated sooner. A lack of modesty is not deadly, but waiting too long to be decontaminated is.

A second key issue of the Omaha MCD concept is that one Soldier assists two casualties at once. In theory, this seems impossible; however, the platoon leader/platoon sergeant mitigates this issue so that it becomes a nonissue—even with some of the most unruly casualties. The proof of concept was confirmed over the course of six exercises, including Vibrant Response 2014, in which 74 properly decontaminated casualties were processed with half the normal manpower per hour.

Further building on the increased efficiency without the privacy barrier, the Omaha MCD concept focuses on the principles of decontamination—for example, only decontaminating what is necessary. If deemed appropriate by the commander, CCP Soldiers should premonitor casualties to detect contamination during triage of ambulatory casualties. If no contamination is found, the casualty then proceeds through the technical decontamination line, where clothes are removed and Soldiers conduct final monitoring. Casualties are then processed to the medical unit if no contamination is detected during final monitoring.

Current MCD training focuses on water as the only means of decontamination, but water is not the only decontaminant. CBRN commanders and leaders at all levels must realize that each chemical reacts differently to water and other decontaminants. For example, water alone will not effectively decontaminate mustard agent due to its poor water solubility. Additionally, water should not be used during a radiation event, as it creates an extremely dangerous situation that results in radiated water. In these cases, vacuums with proper high-efficiency particulate arrestance (HEPA) filters should be used in lieu of water.

This article presents only a brief overview of the Omaha MCD concept. However, specific standard operating procedures and implementation guidance is available. With the new lower FDU personnel numbers, it is imperative that MCD lines operate in a sustainable way. The Omaha MCD concept enables the commander to process casualties with half the available manpower while concurrently increasing efficiency. Also, increasing the number of rotations and decreasing doffing time allow downtime to be maximized, which decreases the possibility that a Soldier will become a heat casualty. Lastly, the Omaha MCD concept saves lives; it is a proven, tested, and more efficient way to decontaminate casualties should the mission require it.

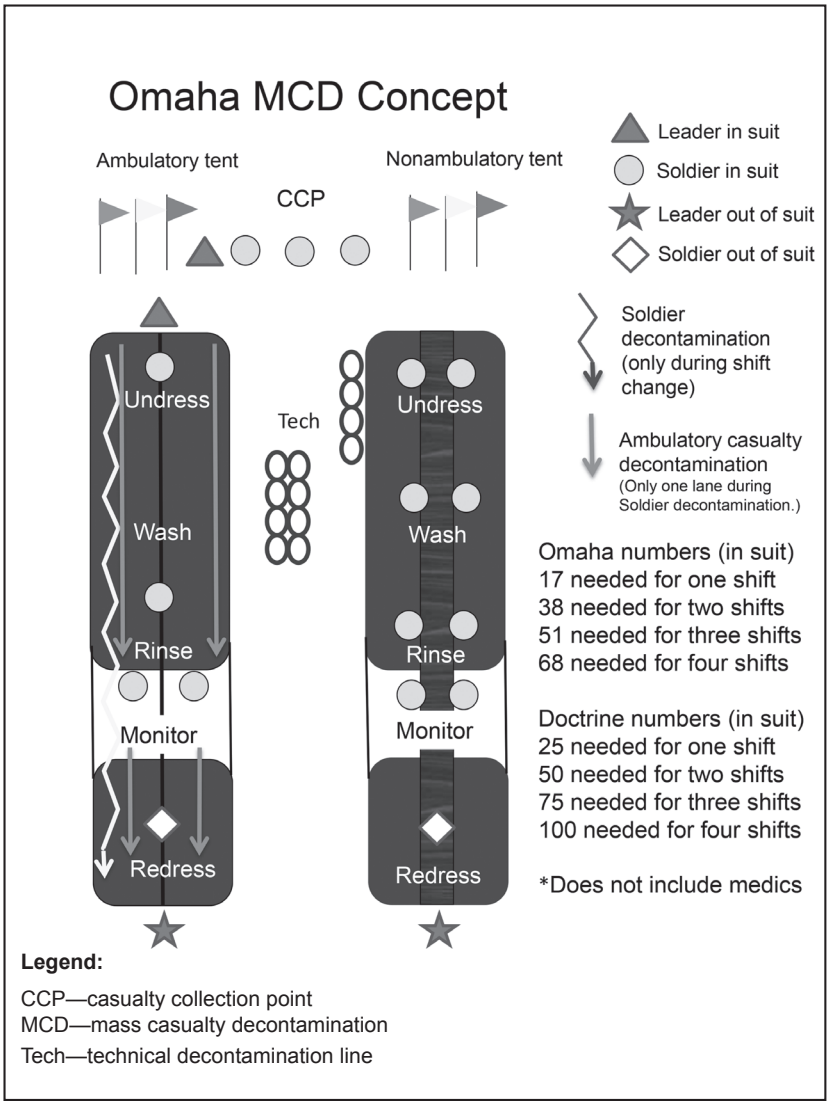
References:

ATP 3-11.41, *Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Consequence Management Operations*, 30 July 2015.

U.S. Army North, Civil Support Readiness Group–Central, *CBRN Technical Support Force (TSF) Mass Casualty Decontamination Smart Book*.

Captain Ratchford is the company commander for the 95th Chemical Company, Joint Base Elmendorf–Richardson, Alaska. He holds a bachelor's degree in political science, international relations, and military affairs from The Citadel, The Military College of South Carolina, and a master's degree in environmental management from Webster University.

Sergeant First Class Beels is a CBRN Advanced Individual Training and CBRN Basic Officer's Leader Course instructor, Fort Leonard Wood, Missouri.



STRATEGIC RISK MANAGEMENT IN THE U.S. ARMY



By Major LeRhonda J. A. Washington

I am a chemical, biological, radiological, and nuclear (CBRN) officer in the U.S. Army. Within the past 18 months, I've been a logistician, budget analyst, force manager, and strategic readiness action officer while serving as a Joint Chiefs of Staff intern in the Pentagon. I'm learning more about the military, policy makers, and the relationship between both entities than I thought possible. I have been exposed to smart people with historical knowledge of the military and Department of Defense (DOD) policy. I have gained perspective in the realm of managing strategic risk in the U.S. Army, which is defined as the probability of failure in achieving a strategic objective at an acceptable cost.[1] The underlying theme of the time I have spent as a Joint Chiefs of Staff intern has been about how to manage strategic risk.

After graduating from Georgetown University, Washington, D.C., with a graduate degree in policy management, Joint Chiefs of Staff interns spend 1 year on the joint staff or the Office of the Secretary of Defense staff and then 1 year on the Army staff. I had the unique experience of rotating throughout three different offices in the J-8 (Force Structure, Resources, and Assessment Directorate). The J-8 is vast, but the primary responsibility of the directorate is to provide analysis and advice on resources and force structure to the Chairman of the Joint Chiefs of Staff. Because I was in each office for less than 6 months, my role was more as an observer soaking up information than as an action officer. Being on the periphery allowed me to gain less-biased insight into the processes of the joint staff.

There are a few unique offices within the J-8, one of which is the Joint Requirements Office (JRO) for CBRN Defense. As a CBRN officer, I was surprised that I had never heard of this office before coming to the Pentagon, but I was excited to work there. The JRO evaluates, assesses, and develops joint operational concepts and capabilities for CBRN defense. This office develops requirements for CBRN defense to support the warfighter. Joint protective and detection gear, such as the M50 mask or Joint Chemical Agent Detector, are either established or refined in the JRO through the Joint Capabilities Integration and Development System requirements process. This system defines acquisition requirements and evaluation criteria for future defense programs.

Much of JRO's time is spent coordinating with offices throughout the vast CBRN enterprise (the Office of the Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs and the Joint Program Executive Office–Chemical Biological Defense) to refine CBRN concepts and capabilities in preparation for the Joint Capabilities Integration and Development System. The JRO manages strategic risk as it pertains to CBRN defense. Communication with the combatant commands (COCOMs) and the JRO focuses on the specific CBRN threat and on whether the command has the proper equipment to detect or combat the threat. The JRO then aligns these command risks with the risk assessment of the Chairman of the Joint Chiefs of Staff. The perspective lesson from the JRO was about the importance of ensuring that the risk assessment is congruent with the higher-command assessment. Risk must be effectively communicated in the JRO so that senior leaders can make optimal resource decisions. Every resource decision assumes some type of strategic risk.

The dollars within DOD are finite. Most J-8 briefs that I attended centered on fiscal limitations. I gained insight on the J-8 budget while serving in the Program Budget and Analysis Division (PBAD). This division facilitates the President's budget cycle, a period in which the budget is initially proposed, modified, approved and, ultimately, funded by Congress. During the budget cycle, initial proposals for the funding of existing programs and projects are presented to the COCOMs. COCOM leaders then accept those proposals or propose an issue. PBAD provides a forum for COCOMs to propose issues and tools for analyzing, justifying, and reporting on the requested budget adjustments. Being a part of PBAD was an invaluable experience; I gained an intimate understanding of the President's budget and the Program Objective Memorandum processes. I filled many binders, and I often cursed my three-hole punch while in PBAD, but I gained perspective on COCOM requirements and the strategic risk these commands would assume if resources for certain programs were left unallocated or worse—unappropriated. I had a poor understanding of the DOD budget process before working in PBAD. I cannot claim to be a DOD budget expert, but I do understand the process and why effectively communicating risk to those with the purse strings (Congress) is paramount to military success.

The last stop on my J-8 tour was the Forces Division. Again, I arrived knowing nothing about how joint forces were managed at a strategic level. I learned that COCOMs gained or lost forces through apportionment, assignment, or allocation. The Forces Division mission is to advise the Chairman of the Joint Chiefs of Staff and the J-8 Director on the joint force structure and its ability to execute *The*

National Military Strategy of the United States of America.[2] Strategy, force structure, and resources are integrated in this office, and the Forces Division acts as the honest broker among the COCOMs and Services, ensuring that force structure supports directed and assigned missions. Again, my perspective was broadened and the most important lesson I learned was about the risk that commands and Services assumed with changes in force structure.

During my year in the J-8, I learned a great deal about our sister Services and joint strategic operations. I understood how managing strategic risk, the budget, and readiness was manifested in a joint, strategic-level staff.

The Army staff was next. Finally, I was back to something familiar. I didn't know what to expect of the Army staff, but at least we wore the same uniform and (hopefully) used "hooah" to answer most questions. It turned out that the uniform and one-word expressions were the only things that I had in common with my next set of coworkers because I was assigned to G-4 (Logistics). My worries were assuaged a little when I went to G-43 (Strategic Readiness and Current Operations), an operations cell for G-4. What do CBRN officers do in the operations office almost everywhere they go? They complete the monthly unit status report (USR). I'm confident that I've done enough USRs to last a lifetime, but the Army staff USR process was different. My perspective broadened when I took on the task of managing the G-4 strategic readiness update (SRU). An SRU is a strategic-level USR in which all COCOMs and Army staff primaries discuss current readiness. The SRU is a monthly report presented to the Vice Chief of Staff of the Army on the readiness of COCOM manning, training, and equipping. I was able to see the readiness reporting loop in the SRU that I never knew existed while completing the brigade USR. Like a USR, the SRU is a snapshot of history that provides limited insight into the future or visibility of trends. This snapshot is valuable in providing current readiness levels, but does not allow senior leaders and staffs the ability to make long-term decisions that could be captured in the budget. This void is filled by a parallel strategic readiness assessment.

The Army Strategic Readiness Assessment gives senior leaders the ability to make optimal financial or force structure decisions now by reducing risk and positively affecting the future. Senior leaders need to predict the future Army in order to properly project resources. In a fiscally constrained environment, the future of the Army depends on enabling senior leaders with accurate decision-making tools. Predictive analysis of Army readiness enables strategic-level staffs to determine the impact of resourcing decisions, alternatives, changes to strategy, and demands for forces on Army readiness. The Services present a culmination of this classified readiness information to the joint staff and Congress through two documents—the Quarterly Readiness Report to Congress and the Joint Forces Readiness Review.

Each Army staff directorate is responsible for an Army Strategic Readiness Assessment tenet, and my work was on the G-4 sustaining tenet defined as the total force ability to sustain operations by maintaining Army readiness, projecting the force, setting theater sustainment, and sustaining unified land operations. The G-4 measures the sustaining tenet by—

- Maintaining Army readiness.
- Projecting the force.
- Setting theater sustainment.
- Sustaining unified land operations.

These four processes are broken down into submeasures that are quantified using carefully researched metric values. Each submeasure can be influenced by a strategic lever. Strategic levers are best thought of as investments (force structure, funds, training). These levers give senior leaders the ability to mitigate strategic readiness shortfalls through various policy or strategy adjustments. The Army Strategic Readiness Assessment redesign expands on the USR and SRU in three primary ways; it—

- Addresses the time horizon to ensure risk management in future years.
- Focuses measures on operational and strategic risk.
- Creates a visualization of risk (risk profile) to show trends.

My assignment at the Pentagon has been a great experience in an incredible learning environment. The historical knowledge within the building is likely unmatched anywhere else in the military. Quality staff work is challenging at every level, yet the goal remains consistent: enable optimal senior leader decision making to effectively manage risk. Operating in a fiscally constrained environment means that the military must know where it stands regarding readiness and what risks it's taking with every decision. Every dollar counts and must be optimized. Even though I've learned a lot as a Joint Chiefs of Staff intern, there is much more knowledge that I wish I could soak up before leaving. Nevertheless, I feel better equipped as a CBRN officer returning to the field with a greater understanding of the joint staff, budget process, CBRN enterprise, and logistics enterprise. Perspective is everything in our field, and I'm grateful that mine has been broadened to benefit the force.

Endnotes:

[1]U.S. Army War College, *U.S. Army War College Guide to Strategy*, February 2001.

[2]Joint Chiefs of Staff, *The National Military Strategy of the United States of America*, June 2015, <http://www.jcs.mil/Portals/36/Documents/Publications/2015_National_Military_Strategy.pdf>, accessed on 27 February 2017.

Major Washington is a CBRN officer and Joint Chiefs of Staff intern working in the G-4, Headquarters, Department of the Army. She holds a bachelor's degree in biology and society from Cornell University, Ithaca, New York, and master's degrees in environmental management from Webster University and policy management from Georgetown University.

Homeland Operations: Army Warfighter Challenge No. 6

By Mr. Tony W. Sexton

Defending U.S. territory and the people of the United States is the highest priority of the Department of Defense (DOD), and providing appropriate defense support of civil authorities (DSCA) is one of the Department's primary missions.
Strategy for Homeland Defense and Defense Support of Civil Authorities[1]

The Army develops capabilities for homeland operations based on national strategies, joint and DOD directives, and current doctrine. These capabilities enable the Army to protect the homeland by deterring and defeating attacks and mitigating the effects of attacks and natural disasters as described in the 2014 Army Operating Concept (AOC), as stated in U.S. Army Training and Doctrine Command (TRADOC) Pamphlet 525-3-1, *The U.S. Army Operating Concept—Win in a Complex World:* "The AOC describes how future Army forces will prevent conflict, shape security environments, and win wars while operating as part of a joint force and working with multiple partners. It provides the intellectual foundation and framework for learning and for applying what we learn to future force development under Force 2025 and Beyond."[2] Concepts do not constitute doctrine, but they serve as the beginning of the process for delivering capabilities to future Army forces. The AOC presents 20 Army warfighting challenges (AWFCs) as first-order problems, the solutions to which improve the effectiveness of the future force. AWFCs provide an analytical framework to integrate efforts across warfighting functions while collaborating with key stakeholders in learning activities, modernization, and future force design.[3] The U.S. Army Maneuver Support Center of Excellence (MSCoE) has been assigned the responsibility to lead AWFC No. 5, Countering Weapons of Mass Destruction (WMD), and AWFC No. 6, Homeland Operations. The AOC requirements reflect the two primary missions identified in the *Strategy for Homeland Defense and Defense Support of Civil Authorities:*

- Defend U.S. territory from direct attack by state and nonstate actors.
- Provide assistance to domestic civil authorities in the event of natural or man-made disasters.[4]

The role of MSCoE as the AWFC No. 6 lead is to guide, facilitate, and integrate learning across Army missions that support deterring and defeating attacks; mitigate consequences of attacks and disasters; support integration into capability development for future force required capabilities; and develop capabilities for MSCoE equities.

Where We Started

When the AOC was issued in 2014, it stated, "To protect the homeland, the Army deters and defeats attacks and mitigates the effects of attacks and natural disasters."[5] These two missions, 1) deter and defeat attacks and 2) mitigate effects, although equally important, had not received equal consideration. Over the preceding decade, TRADOC and the operational force conducted extensive work on the DSCA requirement to mitigate the effects of attacks and natural disasters, primarily for domestic chemical, biological, radiological, and nuclear response. It was evident that the Army had a role in deterring and defeating attacks, but initial analysis identified very limited learning to support capabilities development. This mission is complex and crosscutting and includes many civilian organizations.

Where We Need to Be

The Army must not focus on the homeland itself but must equally balance efforts across the homeland, in the approaches, and in the far regions. This is a whole-of-government approach that will be pursued in the building of the community of practice. The Army's responsibility to protect the homeland is a primary strategic priority. The homeland is increasingly at risk as threats become greater and the world effectively becomes smaller. To meet these more dangerous threats, the Army must prioritize

the development of capabilities to deter and defeat attacks against the homeland and to mitigate the consequences of attacks and disasters in the homeland. The homeland mission must be a consideration for the development of Army capabilities to address the full range of military operations. These considerations must be developed in a concept for homeland operations that describes an Army total force approach to synchronize efforts across components and between the operating and generating forces. A concerted effort is necessary to gain a shared understanding of the homeland defense and DSCA principles and the Army role in DOD missions in support of civil authorities. This entails an analysis of policies that impact the Army ability to conduct homeland operations; define or refine its homeland defense and DSCA principles; and enable capability development across doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF). DOTMLPF addresses critical challenges affecting the operating force ability to perform missions and fosters readiness through coordinated contingency planning and exercises between the Army total force and joint and civil authorities.

The Army must integrate homeland considerations into new and existing scenarios to provide an accurate foundation for Army capabilities development. These scenarios must include a comprehensive model of the domestic operational environment that accounts for the unique homeland conditions, including statutory constraints and relationships with federal, state, and local governments. Experimentation must deliberately evaluate Phase 0 through Phase 2. Given the growing interconnectedness of the homeland with the world, the Army must also account for the mutual effects of domestic events and expeditionary operations to accurately portray the challenges to be faced by the future force.

Within the operational environment affecting homeland operations beyond 2025, the future challenges are too numerous and complex to be addressed solely by U.S. military and civilian agencies. A significant portion of national unified action efforts must be oriented around building foreign partnerships and helping partners attend to their internal challenges. The Army, for example, must enhance partner activities. This approach establishes long-term relationships fostering mutual trust and confidence, promoting a more stable international security environment, and setting conditions to prevail during armed conflict. To prevail, future Army forces must collaborate with unified action partners to develop security capacity and support capacity building of partners' efforts through security cooperation activities at the individual, institutional, and ministerial levels.

Conclusion

The Army must develop capabilities to support assigned missions as an integral part of its effort to develop the Army of 2025 and beyond in support of *The National Military Strategy of the United States of America*.[6] Army analysis over the last 2 years provided some much-needed background, particularly the chemical, biological, radiological, and nuclear response enterprise force modernization effort, to establish a thorough integrated learning plan and solutions strategy for the task of mitigating effects. Moving forward, the primary lines of effort required to support this AWFC are to—

- Define the operational environment for homeland operations in terms of unified action partners, the global operational environment, and homeland-specific conditions.
- Clarify Army roles and responsibilities associated with homeland operations and prioritize their integration into concept and doctrine development as a basis for all Army capabilities development.
- Develop and educate Army leaders at all levels of homeland operations.

MSCoE will continue to lead the collaboration among the stakeholders through monthly meetings of the AWFC No. 6 workgroup, the proposed governance forum, and other venues to ensure the integration of homeland operations throughout Army capabilities development. The homeland operations community will approach this AWFC with a near-term emphasis on readiness and implementation of mature, high-payoff solutions.

Endnotes:

[1]DOD, *Strategy for Homeland Defense and Defense Support of Civil Authorities*, February 2013.

[2]TRADOC Pamphlet 525-3-1, *The U.S. Army Operating Concept—Win in a Complex World*, 31 October 2014, p.i, <http://www.tradoc.army.mil/tpubs/pams/tp525-3-1.pdf>, accessed on 15 December 2016.

[3]Ibid.

[4]*Strategy for Homeland Defense and Defense Support of Civil Authorities*.

[5]TRADOC Pamphlet 525-3-1.

[6]Joint Chief of Staff, *The National Military Strategy of the United States of America*, June 2015, <http://www.jcs.mil/Portals/36/Documents/Publications/2015_National_Military_Strategy.pdf>, accessed on 15 December 2016.

Mr. Sexton is the lead for AWFC No. 6 and a military analyst for the MSCoE Concepts, Organization, and Doctrine Development Directorate, Fort Leonard Wood, Missouri.

Doctrine Discussions on milSuite

By Mrs. Sharon M. McCann and Captain Bryan A. VanBuskirk

There are some great questions about chemical, biological, radiological, and nuclear (CBRN) doctrine that, unfortunately, only circulate within a small community. CBRN Soldiers in the field send questions to training personnel, who then loop doctrine personnel into the discussion. However, there are many other Dragon Soldiers who have the same question but do not benefit from the conversation. In an effort to share these discussions to a larger audience, we would like to share three of the questions that we have recently received and posted on the milSuite Web site.

Do augmentees support decontamination operations?

There is consternation from the field concerning a note that appears in paragraphs 2-258 and 3-49 of Army Techniques Publication (ATP) 3-11.32, *Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Passive Defense:* ". . . Army CBRN forces conduct thorough decontamination without augmentation from the contaminated unit."[1] This seems to contradict Table C-6, which shows personnel and equipment requirements for an optimum detailed equipment decontamination layout that includes augmentees.[2] Many factors affect the scale of a decontamination operation, including the size of the contaminated unit (number and size of equipment pieces), environmental factors, and work–rest cycles.

The purpose of the note in ATP 3-11.32 is to convey the message that the contaminated unit should not have to support itself during decontamination operations. The proposed resolution (although we have no delusions that this will fix the problem) can be found in paragraph B-81: "Much of the coordination should be arranged through the decontamination element or the unit's higher echelon, particularly when involving . . . augmentee support."[3] During planning, higher echelons must be made aware of additional requirements needed in the event that one of their subordinate units becomes contaminated.

How clean should water be for decontamination operations, particularly mass casualty decontamination?

While ATP 3-11.32 is the primary doctrinal source for decontamination operations, it does not contain specific guidance for the cleanliness of water used—except for that used for disinfecting the mask, which requires potable water. This allows commanders to make risk decisions at their level.

Paragraph 2-8 of Technical Bulletin (TB) Medical (MED) 577, *Sanitary Control and Surveillance of Field Water Supplies*, provides additional information:

> *Potable water should also be used for showering because of exposure to cuts and scratches, incidental ingestion, and breathing of volatile or aerosolized material, all of which may allow contaminant entrance into the body. However, disinfected water of less than drinking water quality may be used for showering, personal sanitation, personnel decontamination, and heat casualty cooling after an appropriate health risk assessment of the proposed water supply is performed by [preventive medicine] personnel and the action is approved by the commander.*[4]

Paragraph 2-7, TB MED 577, also states that water quality standards do not apply in emergency situations.[5] Some tactical situations necessitate the use of the best quality water that is available.

Should CBRN staff be able to advise on flame field expedients?

The U.S. Army Chemical, Biological, Radiological, and Nuclear School has not taught how to conduct or plan for flame field expedients for several years. Nonetheless, ATP 3-11.36, *Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Aspects of Command and Control*, states that a core function of the CBRN staff is "Plan[ning] and recommend[ing] the use of flame field expedients to supplement unit defense and existing minefield sand barriers."[6] Doctrine that covers the use of flame field expedients is located in Field Manual (FM) 3-11.11 (Change 1), *Flame, Riot Control Agent, and Herbicide Operations.*[7]

Technical Manual (TM) 3-11.91, *Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Threats and Hazards*, which will supersede FM 3-11.9, *Potential Military Chemical/Biological Agents and Compounds*, and FM 3-11.11, is currently under

review.[8, 9] It contains no references to flame field expedients. When this TM is published, the doctrine for flame field expedients will no longer reside within the Chemical Corps. Unless your commander specifically requests that the unit use flame field expedients, brush up on decontamination or CBRN warning and reporting skills instead.

Conclusion

We want to encourage all Dragon Soldiers to make use of the collaboration resource that milSuite affords them. Just type CBRN community into the search bar on the milSuite homepage at <https://www.milsuite.mil/> and locate the community page link. The topics discussed in this article, as well as many other discussions, can be found on the community page. You can also start a new discussion.

Endnotes:

[1]ATP 3-11.32, *Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Passive Defense*, 13 May 2016, pp. 2-70 and 3-9.

[2]Ibid., p. C-15.

[3]Ibid., p. B-20.

[4]TB MED 577, *Sanitary Control and Surveillance of Field Water Supplies*, 1 May 2010, p. 27.

[5]Ibid., p. 23.

[6]ATP 3-11.36, *Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Aspects of Command and Control*, 1 November 2013, p. I-21.

[7]FM 3-11.11, *Flame, Riot Control Agent, and Herbicide Operations*, 19 August 1996. (Change 1 was published on 10 March 2003.)

[8]TM 3-11.91, *Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Threats and Hazards*, to be published in approximately 1 year.

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

Mrs. McCann is the deputy chief of the CBRN Doctrine Branch, Maneuver Support Center of Excellence, Fort Leonard Wood, Missouri. She retired from the U.S. Army as a first sergeant. She holds a bachelor's degree in homeland security and emergency management from Ashford University, San Diego, California.

Captain VanBuskirk is the CBRN officer for 65th Medical Brigade, Yongsan, Korea. He holds a bachelor's degree in finance from Missouri State University, Springfield, Missouri, and a master's degree in environmental management from Webster University.

Subscribe to the digital version of
Army Chemical Review

Scan the QR code or access the online form at <http://www.wood.army.mil/digital_chmsubscription.htm>.





USACBRNS 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	37600K000	1 December 2016
Nuclear Disablement Team	37611KA00	1 December 2016
WMD Coordination Element	37621KA00	1 December 2016
CBRN Brigade	03492R000	27 April 2017
CBRN Battalion	03396R000	30 November 2016
CBRN Company (Area Support)	03420R300	29 March 2017
CBRN Company (Biological)	03470R000	29 March 2017
CBRN Company (Hazard Response)	03310R000	29 March 2017
CBRN Company (Obscuration)	03440R100	23 March 2016
CBRN Coordination Element	03579RA00	27 April 2017
CBRN Reconnaissance Detachment	03529R000	27 April 2017
CBRNE Company (Technical Escort)	03530R000	29 March 2017
WMD–Civil Support Team	300627-35	5 April 2017

Legend:

CATS—combined arms training strategy

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	Under revision. Comments will soon be accepted through the Joint Doctrine Development Tool.
JP 3-11 focuses on maintaining the joint force ability to conduct the range of military operations in a CBRN environment. The revised JP 3-11 will reference a classified appendix on nontraditional agents that will be available on the secure internet protocol router.			
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. 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 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.			
JP 3-40	*Countering Weapons of Mass Destruction*	31 Oct 14	Current.
JP 3-40 provides an activities construct for countering weapons of mass destruction (WMD). Tasks to counter specific WMD threats are grouped within the activities of understand the operational environment, threats, and vulnerabilities; cooperate with and support partners; control, defeat, disable, and dispose of WMD threats; and safeguard the force and manage consequences.			
JP 3-41	*Chemical, Biological, Radiological, and Nuclear Response*	9 Sep 16	Current.
The newly published revision of JP 3-41 changes *consequence management* to *CBRN response* to highlight the unique Department of Defense (DOD) response capability and responsibility to minimize the effects of a CBRN incident. It incorporates the new DOD integrated CBRN response enterprise capabilities and joint force matrix and clarifies supporting roles during international CBRN response (previously foreign consequence management).			
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	Under review.
Field Manual (FM) 3-11 is the only FM for which the USACBRNS is the lead agent. A request for feedback (RFF) question list will be posted in conjuction with the JP 3-11 review. Comments can be submitted to the CBRN Doctrine Development Division.			

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, describes the WMD–elimination isolation activity as 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. It educates the reader on performing the entire process from cradle (reconnoitering) to grave (monitoring and redirecting) and on planning, preparing, executing, and assessing considerations throughout.			
ATP 3-11.32 MCWP 3-37.2 NTTP 3-11.37	*Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Passive Defense*	13 May 16	Current.
ATP 3-11.32 contains information for conducting operations; performing tactics, techniques, and procedures (TTP); and understanding how to carry out CBRN passive defense. A complementary technical manual (TM) (TM 3-11.32/MCRP 10-10E.5/NTRP 311.25) will be published in 2017. It will contain reference material for CBRN warning, reporting, and hazard prediction procedures.			
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	Under revision. The name will change to *Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Planning*.
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. Change 1 published April 2017 includes changes to Appendix J.
ATP 3-11.37 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 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 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.			
ATP 3-11.41 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*	30 Jul 15	Current. Update will be made in the near future to incorporate changes from the new JP 3-41.
ATP 3-11.41 provides commanders, staffs, key agencies, and military members with a key reference for planning and conducting CBRN consequence management. This publication provides a reference for planning, resourcing, and executing CBRN consequence management in support of domestic or foreign agencies responding to a CBRN incident. The principal audience for this multi-Service publication consists of CBRN responders who plan and conduct CBRN consequence management operations in domestic, foreign, or theater operational environments, to include military installations.			
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. ATP 3-11.46 will be revised to incorporate changes in doctrine from updated JP 3-11, JP 3-28, and JP 3-41 and how the WMD-CST concept of operations is integrated into the CBRN Response Enterprise (CRE) structure.			
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.
ATP 3-11.47 contains detailed tactical doctrine and TTP and sets the foundation for the tactical employment of the CERFP and HRF. It will be consolidated into a multi-Service CRE manual, incorporating revisions of JP 3-41, ATP 3-11.41, and ATP 3-11.46 in the near future.			

Number	Title	Date	Status
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 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. A change will be published in the near future to address the change in capabilities, including the removal of reference to CBRN obscuration units.			
ATP 3-90.40	*Combined Arms Countering Weapons of Mass Destruction*	TBD	Under development.
ATP 3-90.40 will provide tactical-level commanders, staffs, and key agencies with a primary reference for planning, synchronizing, integrating, and executing combined arms countering weapons of mass destruction.			
Technical Manuals			
The USACBRNS is the proponent and approving authority for two TMs.			
TM 3-11.32 MCRP 10-10E.5 NTRP 311.25 AFTTP 3-2.56	*Multi-Service Reference for Chemical, Biological, Radiological, and Nuclear (CBRN) Warning, Reporting, and Hazard Prediction Procedures*	TBD	Under development. Will be published 2017.
TM 3-11.32 will provide reference material for CBRN warning messages, incident reporting, and hazard prediction procedures.			
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.
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.
TM 3-11.91 will serve as a one-stop shop for information to help understand the CBRN environment. It will include 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 will also include basic educational information and cover the "so what" and the field behavior of CBRN hazards (including riot control agents and herbicides). The appendixes will contain scientific CBRN data, and the centerpiece of the manual will be the CBRN threats and hazards diagram.			

"Doctrine is indispensable to an Army. Doctrine provides a military organization with a common philosophy, a common language, a common purpose, and a unity of effort."

—General George H. Decker,

U.S. Army Chief of Staff, 1960–1962

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 Master Sergeant Larry Foreman at (573) 563-7757 or <larry.d.foreman.mil@mail.mil>.
74D10 CBRN Specialist Course (School Code L031)	
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.
74D 2/3/4 CBRN Transition Course (School Code L031)	
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. Hazmat Awareness Training is now a prerequisite for all courses. The Air Force Civil Engineer Center (AFCEC) Web site no longer contains the training. Training can still be completed at <http://totalforcevlc.golearnportal.org/>. (A common access card [CAC] is required.)	
74D30 CBRN ALC (School Code L031, 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 L031, Course 031-74D40-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://afcec.adls.af.mil> 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, Master Sergeant Larry Foreman, at (573) 563-7757 or <larry.d.foreman.mil@mail.mil>. The successful completion of Phase I 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 Master Sergeant 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 Senior Leader Course (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. You are required to register for the Joint SLC through the Joint SLC action officer, Mr. Brad Sanders at <bradley.w.sanders.ctr@mail.mil> or (573) 528-9491. Registration through ATTRS will not guarantee a seat and may result in being bumped from the course.
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 operations levels. The Hazmat Awareness course is now a prerequisite for all courses. The AFCEC Web site no longer contains the training. Training can still be completed at <http://totalforcevlc.golearnportal.org/>. (A CAC is required.)
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 training development 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 the brigade senior operations NCO, Master Sergeant Yamil Rodriguez at (860) 570-7114 or <yamil.rodriguez.mil@mail.mil>.

Contact Information

Lieutenant Colonel Leslie M. Dillard (DAC-AR), (573) 563-8050 or <leslie.m.dillard.mil@mail.mil>.

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

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

Lieutenant Colonel Robert W. Mandell (DAC-NG), (573) 563-7676 or <robert.w.mandell2.mil@mail.mil>.

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

Staff Sergeant Saugat K. Brookshire (RC-LNO), (573) 596-3226 or <saugat.k.brookshire.mil@mail.mil>

Reference:

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

The Commandant's Reading Program

Compiled by Lieutenant Colonel James P. Harwell

President Harry S. Truman once said, "Not all readers are leaders, but all leaders are readers." Reading should form the foundation of every leader's self-development program. It supplements institutional training and operational experience and provides leaders with knowledge to react to a complex world. The Commandant's Reading Program provides chemical, biological, radiological, and nuclear (CBRN) leaders with the basis for a lifelong self-development program. It supplements other reading lists from the Chief of Staff of the Army to the local unit level, with a particular emphasis on the CBRN profession. The Commandant's Reading Program is all-inclusive. CBRN leaders should use it as a guide, but should develop their personal programs based on their individual needs, knowledge, and experiences.

With each issue of *Army Chemical Review*, the reading program continues to evolve. Based on Brigadier General James Bonner's guidance, the program is expanding. Previous entries on the CBRN profession and weapons of mass destruction (WMD) terrorism are now joined by entries on leadership; strategy; and the building of agile, adaptive leaders and effective organizations. Lastly, each issue continues to include works on contemporary issues facing the CBRN community of practice and profession of arms.

CBRN Profession

- Graham T. 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, Washington, D.C., 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 and 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, 2002, 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, New York, 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.
- Jonathan 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.

Leadership

- Marcus Aurelius, *The Emperor's Handbook: A New Translation of the Meditations*, Scribner, New York, 2002, ISBN-13: 978-0743233835.
- David Cloud and Greg Jaffe, *The Fourth Star: Four Generals and the Epic Struggle for the Future of the United States Army*, Three Rivers Press, New York, 2009, ISBN-13: 978-0307409072.
- Eliot A. Cohen and John Gooch, *Military Misfortunes: The Anatomy of Failure in War*, Free Press, New York, 1990, ISBN-13: 978-0743280822.
- Epictetus, *Enchiridion*, Dover Publications, New York, 2004, ISBN-13: 978-0486433592.
- Victor Davis Hanson, *The Savior Generals: How Five Great Commanders Saved Wars That Were Lost–From Ancient Greece to Iraq*, Bloomsbury Publishing, New York, 2013, ISBN-13: 978-1608193424.
- John P. Kotter, *Power and Influence*, Free Press, New York, 1985, ISBN-13: 978-1439146798.
- Stanley A. McChrystal, *My Share of the Task: A Memoir*, Portfolio, New York, 2014, ISBN-13: 978-1591846826.

- David Richards, *Taking Command*, Headline, London, 2014, ISBN-13: 978-1472220844.
- Thomas E. Ricks, *The Generals: American Military Command from World War II to Today*, The Penguin Press, New York, 2012, ISBN-13: 978-0143124092.
- James B. Stockdale, *Thoughts of a Philosophical Fighter Pilot*, Hoover Institution Press, California, 1995, ISBN-13: 978-0817993924.
- Martin van Creveld, *Command in War*, Harvard University Press, Massachusetts, 1985, ISBN-13: 978-0674144415.
- Anthony C. Zinni and Tony Koltz, *Before the First Shots Are Fired: How America Can Win or Lose Off the Battlefield*, St. Martin's Press, New York, 2014, ISBN-13: 978-1137279385.

Strategy

- Zbigniew Brzezinski, *Strategic Vision: America and the Crisis of Global Power*, Basic Books, New York, 2012, ISBN-13: 978-0465061815.
- Everett C. Dolman, *Pure Strategy: Power and Principle in the Space and Information Age*, Frank Cass, New York, 2005, ISBN-13: 978-0714684987.
- Lawrence Freedman, *Strategy: A History*, Oxford University Press, Oxford, 2013, ISBN-13: 978-0199325153.
- Richard N. Haass, *Foreign Policy Begins at Home: The Case for Putting America's House in Order*, Basic Books, New York, 2013, ISBN-13: 978-0465071999.
- George C. Herring, *From Colony to Superpower: U.S. Foreign Relations Since 1776*, The Oxford History of the United States, Oxford University Press, New York, 2008, ISBN-13: 978-0199765539
- Robert D. Kaplan, *Asia's Cauldron: The South China Sea and the End of a Stable Pacific*, Random House, New York, 2014, ISBN: 978-0-8129-9432-2.
- Robert D. Kaplan, *The Revenge of Geography: What the Map Tells Us About Coming Conflicts and the Battle Against Fate*, Random House Trade Paperbacks, New York, 2012. ISBN-13: 978-0-8129-8222-0.
- Paul M. Kennedy, *The Rise and Fall of the Great Powers: Economic Change and Military Conflict from 1500 to 2000*, Random House, New York, 1987, ISBN-13: 978-0679720195.
- Stanley A. McChrystal, et al., *Team of Teams: New Rules of Engagement for a Complex World*, Portfolio, New York, 2015, ISBN-13: 978-0241250839.
- Williamson Murray and Peter R. Mansoor, *Hybrid Warfare: Fighting Complex Opponents from the Ancient World to the Present*, Cambridge University Press, New York, 2012, ISBN-13: 978-1107643338.
- Joseph S. Nye Jr., *The Future of Power*, Public Affairs, New York, 2011, ISBN-13: 978-1610390699.
- Nancy Sherman, *Stoic Warriors: The Ancient Philosophy Behind the Military Mind*, Oxford University Press, New York, 2005, ISBN-13: 978-0195315912.
- Richard H. Shultz and Andrea J. Dew, *Insurgents, Terrorists, and Militias: The Warriors of Contemporary Combat*, Columbia University Press, New York, 2006, ISBN-13: 978-0231129824.







PIN: 201476-000