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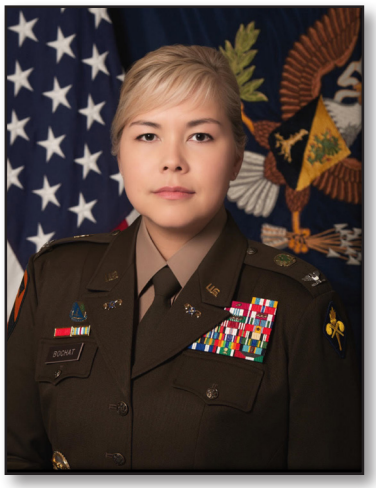
Chief of Chemical and Commandant

U.S. Army Chemical, Biological, Radiological, and Nuclear School



Colonel W Bochat

I am proud to be your 33d Chief of Chemical and Commandant of the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS), Fort Leonard Wood, Missouri. As I aggressively engage units in the U.S. European Command (EUCOM), the U.S. Indo-Pacific Command (INDOPACOM), and the U.S. Army Forces Command (FORSCOM), our priorities remain nested with those of our Chief of Staff of the Army:

- Warfighting.
- Delivering combat formations.
- Fostering continuous transformation.
- Strengthening our profession.

These priorities are essential as we navigate the challenges of the modern battlefield and ensure the Army's agility, adaptability, and readiness to defend our Nation's interests.

Warfighting

Our mission revolves around enhancing chemical, biological, radiological, and nuclear (CBRN) readiness throughout the entire U.S. Army formation. Under my leadership as Chief of Chemical and USACBRNS Commandant, we actively collaborate with a spectrum of partners and stakeholders, encompassing international entities, joint forces, corps, divisions, protection cells, and CBRN formations. This concerted effort aims to synchronize your experiences and missions with the overarching strategic objectives of the Army.

Through these collaborations, a notable revelation has surfaced: The Army ceased the formal reporting of CBRN defense equipment with unit status reports in 2019. As a CBRN professional, I staunchly advocate that maintaining accurate accountability of CBRN defense equipment is imperative. Such meticulous oversight is pivotal in enhancing CBRN readiness and mitigating associated risks. We must recognize our adversaries' strategic focus and ensure that our enemies cannot deny our missions in future conflicts.

Delivering Combat Formations

As CBRN professionals, we must focus on the following three fundamental aspects of CBRN resiliency:

- **Personal protective equipment (PPE).** It is critical that PPE be donned within the allotted time in order to ensure survival. For most Army formations, Joint Service Lightweight Integrated Suit Technology is the appropriate PPE for CBRN threats. However, specialized formations may require specialized PPE. After donning PPE to standard, realistic training must be conducted to ensure that missions can be executed while in PPE.
- **Detection.** Training to employ all assigned CBRN detectors and assess CBRN hazards is crucial. This includes maintaining equipment, training, and confirming or denying the presence of CBRN threats in preparation for PPE recommendations, operations plans, mitigation, and attribution of some specialized units in court.
- **Decontamination.** After successfully donning PPE and detecting a CBRN hazard, contamination must be mitigated. This includes decontaminating any contaminated equipment and PPE, which, in turn, requires maintaining equipment and teams, training in decontamination operations, and practicing safe decontamination exit procedures.

Fostering Continuous Transformation

Continuing our endeavors, we are steadfast in developing prototype capabilities specifically designed to tackle anticipated challenges of the large-scale combat operations envisioned for the Army of 2030. Simultaneously, we're conducting a comprehensive assessment of our force structure to ensure its alignment with the evolving demands of modern warfare. This evaluation is crucial for optimizing the deployment and utilization of our capabilities, ensuring that we're strategically positioned at all levels to effectively maneuver in multidomain operations. We bolster our readiness and efficacy on the frontlines by fine-tuning our organizational structure to meet the dynamic needs of contemporary battlefields.

Strengthening Our Profession

Strengthening our profession is the foremost imperative for the Chemical Regiment. We must enhance our training methodologies, foster the growth of our personnel, and optimize our resource procurement strategies. A pivotal shift from passively observing lessons to actively learning from our historical endeavors, thereby averting the recurrence of errors, is necessary. We are currently engaged in numerous initiatives that require your involvement in order to guarantee alignment with our key objectives; these initiatives notably include the *USACBRNS Newsletter*; the mentorship program; and CBRN knowledge, information, and tools.

Conclusion

As I near the conclusion of my tenure as the 33d Chief of Chemical and Commandant of USACBRNS, I am deeply honored and humbled to have had the opportunity to serve our Corps. I eagerly anticipate the accomplishments that lie ahead in the years to come.

I want to extend my gratitude to the members of the Regiment who, day in and day out, tirelessly support our mission. Your unwavering dedication has been invaluable, allowing us to remain steadfast in our training and support to the maneuver forces over the years. To all of our esteemed Dragon Soldiers and their Families, Department of the Army civilians, CBRN enterprise stakeholders, and joint partners across the globe: Your unwavering commitment exemplifies the strongest CBRN team our Nation has ever witnessed. We stand as the decisive edge, steadfastly supporting the future force.

Dragon Soldiers! CBRN Warriors! Elementis, Regamus, Proelium!

Regimental Command Sergeant Major

Teammates, as I enter my second year as your 16th Regimental Command Sergeant Major, I continue to be amazed at the quality and sheer volume of work you do as chemical, biological, radiological, and nuclear (CBRN) professionals across the enterprise. In our many travels across the globe, the commandant and I consistently meet and engage with CBRN Soldiers who work hard every day to ensure that our Nation's Army is prepared to win in an all-hazard environment. Even more importantly, your senior mission commanders and sergeants major echo my sentiments.

Command Sergeant Major
Raymond Perez Quitugua Jr.

This past year, we have focused on building toward the Chemical Corps of 2030 while also setting the foundations for the Chemical Corps of 2040 and beyond, and we are proud of our accomplishments. Following guidance from the most senior Army leaders, our efforts have centered on the technological changes necessary to combat predicted future threats. Among these initiatives is the application of advanced machine learning and robotics across our Corps protect, assess, and mitigate competencies.

However, we also consistently contend that even the most advanced technological breakthroughs will never replace our most valuable asset on the battlefield—U.S. Army Soldiers. Therefore, we must continue to invest in training, professional military education, and professional development of our CBRN Soldiers, as it is they—not the equipment—who will make the real difference on the battlefield.

This realization further showcases the importance of the recently conducted enlisted critical task site selection board. CBRN leaders representing all components came together at Fort Leonard Wood, Missouri, and thoroughly reviewed more than 330 CBRN tasks across the institutional, operational, and self-development domains. The complete results of the enlisted critical task site selection board, which will be released later this year, will help influence training and professional military education. We expect significant changes to Advanced Individual Training, the Advanced Leaders Course, and the Senior Leaders Course. There will also be changes to CBRN functional courses as well.

For professional development, we have proposed bold updates to Department of the Army (DA) Pamphlet (Pam) 600-25, *U.S. Army Noncommissioned Officer Professional Development Guide*,[1] particularly regarding critical leader development assignments. We have also introduced language and guidance that reflects the order of the merit list promotion system and other new Army talent management initiatives, such as the Sergeant Major Assessment Program. These updates will help shape the kinds of leaders that the Chemical Corps will need in the future fight. Your Corps proponency sergeant major, Sergeant Major Gedney P. Riley, and his team in the Personnel Development Office are spearheading these herculean efforts.

As you can see, the future fight is the theme of my message. To meet future requirements, we must make decisions now. The year 2030 is right around the corner; we must focus beyond that to ensure that the pace of modernization matches the anticipated demands. Regardless, we are in a great space right now. The rest of the command team and I could not be more proud to be a part of this team. We look forward to continuing to see the fantastic things you are doing as we visit the force.

Dragon Soldiers! CBRN Warriors!

Elementis, Regamus, Proelium! Be all you can be!

Endnote:

[1]DA Pam 600-25, *U.S. Army Noncommissioned Officer Professional Development Guide*, 11 December 2018.

Regimental Chief Warrant Officer

Greetings, Dragon Warriors! What an honor it is to write this first article as the 5th Regimental Chief Warrant Officer of the Chemical Corps. I am humbled and blessed to have the opportunity to serve in this capacity. Many of you are aware that I assume this role with experience gained during my tenure as the 1st Regimental Chief Warrant Officer. Witnessing the progress and changes in the cohort over the past 13 years has filled me with a sense of excitement for what will take place in the foreseeable future. I would like to highlight the importance of remembering that progress requires everyone working together.

Chief Warrant Officer Four Matthew D. Chrisman

As the operational environment changes, the U.S. Army must look to the future. What the Army sees in 2040 is that it will only be successful with well-trained and mission-ready warrant officers. To this end, the Army has asked all branches with warrant officers to improve how they assess, educate, and retain their warrant officers. Along with the 33d Chief of Chemical and Commandant and the 16th Regimental Command Sergeant Major, I am confident that the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS) has developed processes that will accomplish all of these objectives.

In 2023, members of the very first chemical, biological, radiological, and nuclear (CBRN) warrant officer class were promoted, giving the Regiment its first warrant officers four. CBRN warrant officers grew by five warrant officer two positions in the CBRN reconnaissance companies and one warrant officer three position in the 1st Special Forces Command Headquarters, Fort Liberty, North Carolina. Lastly, the Maneuver Support Center of Excellence, Fort Leonard Wood, established the first-ever Office of the Command Chief Warrant Officer. However, with all these firsts, there is still more to come.

In order to select the right noncommissioned officers (NCOs) as warrant officer candidates, we must review the accession process, which is the first and most vital step in developing a strong and healthy warrant officer cohort. Warrant officer proponents require that NCOs achieve prerequisites and attain certain knowledge, skills, and behaviors in order to be considered for follow-on service as warrant officers. The CBRN warrant officer cohort can only exist because of NCOs. As your Regimental Chief Warrant Officer, I intend to be every bit as invested in the development of our NCOs as I am with our warrant officers. I have reached out in partnership with the Regimental Command Sergeant Major on initiatives in training, education, and mentorship that will further strengthen our NCO ranks. Other proposals, such as direct appointment, direct commission, and junior enlisted accessions, are also at the disposal of proponents as they build the health of their warrant officer cohorts. Strong warrant officers one arriving at their first units of assignment are the byproduct of a well-managed and motivated NCO population.

According to Ellen M. Lord, former Under Secretary of Defense for Acquisition and Sustainment,"The framework of lethality is readiness and modernization."[1] NCOs accessed to become warrant officers must be educated in order to advance the health of their cohort. Every proponent is responsible for educating its cohort, thus preparing its members for their inaugural assignments as warrant officers. Considering this requirement, the U.S. Army Combined Arms Center, Fort Leavenworth, Kansas, has directed that all warrant officer professional military education be modernized. The intent is to close gaps in education, thereby improving the readiness of Army warrant officers. The USACBRNS Department of Training and Leader Development is working to modernize the Warrant Officer Basic, Intermediate, Advanced, and Senior Courses. The Warrant Officer Master Course at the Warrant Officer Career College, Fort Novosel, Alabama, is also under development; attendance is nominative.

After accessing and educating warrant officers, retention is the final step. Retaining warrant officers will help ensure that the Army of 2040 can deploy with a well-trained and ready warrant officer cohort. Initiatives, including warrant officer retention bonuses and below-zone promotions, are additional weapons available for each warrant officer proponent. Various incentives must be explored to ensure retention of the most highly technically trained and educated Soldiers of the U.S. Army. The Army investment in warrant officers is evident through the continued service of warrant officers in the chief warrant officer four and chief warrant officer five ranks. Assuming criteria is met, warrant officer branches seeking these incentives must encourage continued service.

Thank you to all Dragon Soldiers who are "leaving it all out on the field" every day for this Nation. I speak for all CBRN warrant officers when I express sincere gratitude for standing shoulder to shoulder in the preservation of freedom.

Thank you. Elementis, Regamus, Proelium!

Endnotes:

[1]Terri Moon Cronk, "DoD Official: Lethality, Readiness Drive Acquisition and Sustainment Reform," *DoD News*, 2 May 2018, <https://www.defense.gov/News/News-Stories/Article/Article/1510642/dod-official-lethality-readiness-drive-acquisition-and-sustainment-reform/>, accessed on 8 March 2024.

U.S. Army CBRN Capability Development Update

By Colonel Scott D. Kimmell (Retired)

To fight, survive, and win in operations against 21st-century adversaries, we must leverage ingenuity and technology to develop comprehensive solutions. These solutions should provide situational understanding of potential chemical, biological, radiological, and nuclear (CBRN) hazards; ensure protection with efficient protective equipment; and mitigate the consequences of contamination with limited time and resources. Developing capabilities to achieve these ends requires a comprehensive approach that encompasses all warfighting functions, including protection, and these capabilities must be integrated across doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P). In coordination with the entire CBRN enterprise, the U.S. Army Chemical Regiment continues to make progress toward delivering the required capabilities to the warfighter. This article presents an update on five of the programs designed to do that within and across our three core functions of assess, protect, and mitigate and provides a glimpse into future CBRN defense capabilities.

Assess

The Compact Vapor Chemical Agent Detector (CVCAD) is a networked, wearable capability designed to detect and presumptively identify vapor hazards; it could potentially replace the Joint Chemical Agent Detector. Initial prototyping of the CVCAD was recently completed, with the results used to provide input for the joint requirement. The CVCAD will be demonstrated at a Soldier touchpoint at Fort Carson, Colorado, and the feedback will be used to narrow potential solutions that are most likely to meet the capability needs of the joint force.

While the Army strategy for biological defense continues to evolve, development of the Joint Biological Tactical Detection System—a networked biological detection capability designed to provide warning—is nearing completion. The plan is for production systems to be included in a multi-Service operational test event next year and then to go on to full-rate production and fielding beginning in 2026.

Protect

Shielding the individual Soldier from CBRN hazards has always been a top priority for the Army and the Chemical Regiment. Current percutaneous protection is effective, but cumbersome and physiologically burdensome.

The Uniform Integrated Protection Ensemble (UIPE) is being developed to decrease the degradation of an individual Soldier's combat power. The UIPE is a two-piece, lightweight, chemically protective combat uniform that is made of air-permeable material and has an aerosol liner treated with liquid repellent. It is slated to replace the Joint Service Lightweight Integrated Suit Technology. The UIPE is in the final stages of development. Production-representative suits continue to be tested to determine where further improvements on the design and durability can be made. Limited production of this capability is expected in 2025. Once the suit meets the requirements necessary to support its intended use by the warfighter, full-rate production will begin.

Mitigate

In December 2023, the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS) Commandant commissioned a decontamination working group consisting of representatives across all major commands to assess current decontamination capabilities across DOTLMPF-P and determine how to best immediately improve readiness.

While still in the early stages of science and technology development, the Automated Decontamination System (ADS) program is exploring potential robotic integration and capability to reduce time and manpower requirements for CBRN hazard contamination mitigation. These efforts, coupled with a complete assessment across DOTMLPF-P, are focused on how decontamination should be executed in 2040. Permission to move the ADS program into continued analysis and to research and gather information on potential solutions and estimated costs for achieving ADS capability has been granted. The next major milestone will be the receipt of permission for the materiel developers to begin prototyping and testing solutions that have been identified to fulfill the ADS requirement.

Enable Capability Across Core Functions

Chemical, Biological, Radiological, and Nuclear Support to Command and Control (CSC2) is a joint effort that is underway to integrate CBRN awareness and understanding across the common operating picture. This networked capability will be designed to synchronize and integrate CBRN data and information into the commander's common

operating picture at all levels from battalion to joint task force, allowing commanders to make proactive risk-based decisions in CBRN environments. CSC2 is expected to undergo an operational assessment before the end of 2024, with expected delivery to the Army in 2026. After its initial release, subsequent software updates will occur every 3 months in order to improve the capability.

Way Ahead

The successful modernization of the CBRN defense capability is dependent on a better understanding of CBRN hazards and the consequences of contamination and exposure in operational environments. Neither dated Cold War era field studies nor present-day laboratory experiments correlate well with future operating concepts or environments. Science-based studies are imperative in ensuring appropriate input for future solutions. As with other battlespace hazards faced by Soldiers, there are no absolutes with CBRN—only varying degrees of probability and consequences (expressed by risk). But, while CBRN is one of the eight forms of enemy contact, CBRN hazards are frequently misunderstood and generally neglected, but widely feared. Why do CBRN considerations differ from those of other enemy contact forms? Simply put, they carry the stigma of being in the "too hard to do" box and/or are assumed to be unlikely threats. Neither is true, and perceptions must change.

Commanders must be enabled to make proactive, risk-based decisions in CBRN environments based on a better understanding of the impacts of those decisions in time and space. Capability modernization is contingent on integration of the three core functions, providing leaders with the ability to reduce—not eliminate—risks. The development of capabilities across the core functions of assess, protect, and mitigate, woven together by DOTMLPF-P integration, provides the foundation for successful operations in future CBRN environments.

Conclusion

Dismissing the CBRN myths of the past and replacing them with an understanding of CBRN environments and potential hazards is crucial to modernization. (Because the elimination of CBRN risk is unachievable, attempts at completely removing the risk are a waste of resources and time.) If we can provide a better understanding of the threat, train and equip our force to operate in its proximity, and mitigate the CBRN hazard risk to acceptable levels, then CBRN modernization will be achievable in the not-so-distant future. As with all forms of enemy contact, CBRN risk is inherent but manageable. We must enable our leaders and their formations to manage that inherent risk in future CBRN environments.

Colonel Kimmell (Retired) is the deputy commandant of USACBRNS. He holds a bachelor's degree in geology from Eastern Illinois University, Charleston, and master's degrees in education, advanced military studies, and strategic studies. He is also a U.S. Army War College graduate. Colonel Kimmell retired from the U.S. Army after 30 years of service, with his last assignment being the assistant commandant of USACBRNS.

By Major Eric Hurtado

The strength of our force is derived from the people placed into our ranks, and that strength is extended through the partner nations with which the U.S. Army regularly operates. Our partnerships in the Pacific and throughout Europe continue to become stronger. We share with one another and, together, find ways to improve our methods. I've seen how our alliances have provided various opportunities for us to observe and interact with other nations' chemical, biological, radiological, and nuclear (CBRN) operations. I have participated in multiple multinational exercises and would like to share some relevant topics and present a way forward for other CBRN leaders.

Historical Partnerships

Yama Sakura, an annual exercise with the Japan Ground Self-Defense Force, is the largest U.S.-Japan bilateral and joint command post exercise. A joint task force is established and aligned with the ground component command to repel an invasion of Askari forces in defense of the sovereign nation of Japan.

Every CBRN leader is aware of a possible North Korean invasion of South Korea; that scenario highlights the relevance of CBRN units in supporting the maneuver fight.

Cobra Gold is an annual multinational military exercise held in Thailand. The exercise brings eight nations together as a combined multinational staff to defend the fictitious sovereign nation of Tierra del Oro against an invading force from the ficticious nation of Sonora, which is disputing territorial alignments. The combined multinational staff then plans options for conducting forcible-entry operations, decisive operations, space operations, and defensive cyber operations in a dynamic information operations environment.

Talisman Saber is a biannual bilateral exercise with Australia that began in 2005. This exercise shapes the environment such that a joint task force repels an invading force. The joint task force focuses on crisis planning and contingency response, enhancing the military capabilities of both nations within the Asia-Pacific region. Employing all capabilities of the joint force adds a layer of complexity when the live events occurring in Townsville Training Area, northern Queensland, are aligned with the joint task force headquarters at Gallipoli Barracks, southern Queensland.

Working with our North Atlantic Treaty Organization partners allows our Army to integrate its capabilities in a familiar scenario. In the decisive-action training environment scenario, Donovia (a fictitious country) has invaded sovereign nations and the North Atlantic Treaty Organization invokes Article 5 of the treaty, which launches forces into large-scale combat operations.[1] Using joint and multinational assets ensures that each enabler brings its full force of capabilities to defeat and deter any further aggression by Donovia.

CBRN Role in Large-Scale Combat Operations

CBRN capabilities allocated for each exercise are commensurate with the CBRN response to the threat level for each theater of operation. While a CBRN threat is unlikely in some countries, significant threats are possible in others. The CBRN tactics, techniques, and procedures that we have established with some of our allied partners are unmatched and can be integrated, synchronized, and employed in CBRN formations in-theater without hesitation.

As we transition to the Joint Multinational Readiness Center (JMRC), Hohenfels, Germany, where the capacities of our partners are different, we encounter some limiting factors. The time alloted to integrate and place formations into the fight is reduced. Some allied divisions require extra time to understand the specifics of the CBRN forces participating in the exercise. The U.S. Army relies heavily on its multinational partners to fill the CBRN capabilities gap when CBRN formations are required during rotations.

Multidomain and Multifaceted Officers

CBRN officers remain the Army's most agile and adaptable leaders in the formation. Covering various additional duties and branch-immaterial billets and commanding multiple formations, they must be knowledgeable about every warfighting function and must be experts in their branch. Multidomain operations present an opportunity for G-34 (protection cells) to get involved in managing warfighting functions. Allocation requests are considered by the decision board, and the refined analysis and course of action are presented to the commanding general. The staff must conduct mission analysis ahead of time through the military decision-making process.

A U.S. Soldier provides aid to a simulated casualty during an exercise at JMRC.

A division commander needs ample time to weigh risks and make decisions.

Global Modernization

Our modernized CBRN capabilities need to be employed in JMRC exercises. One course of action for integrating CBRN considerations into staff planning involves CBRN staff officers advocating in the correct forums. As leaders, we accomplish this by becoming experts in risk management and leading that process for the staff. We utilize our staff positions to inform the commander and leadership.

While serving with the I Corps staff, the chief of the CBRN Section developed an enhanced version of the risk managment tool for the commander to consider for use. This product created the opportunity for additional touchpoints with staff planners and guided the conversation toward potential CBRN needs.

The I Corps protection cell improved the Mission Command Training Program product key decision points, concentrating on the most critical hazard for the force. The I Corps CBRN Section then determined if the risk would be avoided, eliminated, or mitigated. Next, the CBRN Section created an overlay consisting of the G-35 (future operations) 6-day concept sketch that outlined the battlefield space and time. The section was then able to overlay key numbered markers where potential operational risk existed and identify those locations on the map with the same key markers.

Commanders quantitatively analyze the uncertainty and variability of operational risk assessments, which improves a plan that is based solely on simple point estimates of individual risk assessments. This provides decision makers with more information about the reliability of the results.[2] Because risk ebbs and flows throughout the joint operations area, the goal is to capture the peak moments in which the commander will need to assume risk. Identifying risk for the commander should be synchronized with operational timing.

The methodology evolved into a situation in which the G-34 protection cell led exercises such as the Strategic Support Area Tabletop Exercise. During this exercise, the I Corps protection cell developed a threat analysis for securing lodgment in order for the corps to complete joint reception, staging, onward movement, and integration in response to a host nation enemy threat. Next, a security plan was developed for deploying the corps and enabling brigades through the Port of Tacoma, Washington, while reducing risk in ground lines of communications and at the port.

Becoming better staff officers makes our Chemical Corps deadly. We continue to accomplish this goal through our ability to sustain several nontraditional career paths. We must use our collective knowledge and experiences to inject

(Continued on page 12)

Allied soldiers speak to a U.S. Army observer during a simulated gas attack at a JMRC exercise.

The Dragon Cave: A Central Repository for Dynamic CBRN Planning

By Sergeant First Class Jesus Ambrocio

The U.S. Army Chemical Corps must gain an edge in multidomain operations through a data-centric, decentralized, and doctrinally sound mission planning hub. As the Army and the Department of Defense (DoD) continue to adopt the mission command software known as the Tactical Assault Kit (TAK)—which supports cross-platform tools across various (including mobile) operating systems and devices—the Chemical Corps could lead the chemical, biological, radiological, and nuclear (CBRN) mission-planning fight on Android Tactical Assault Kit (ATAK) devices through a central repository of approved mission templates.

An ATAK in use in the field

Mission planning for CBRN missions currently involves pen and paper; dismounted reconnaissance sets, kits, and outfits; laptops; and other government-furnished equipment. The process for achieving continuous improvements in dismounted reconnaissance sets, kits, and outfits and other government-furnished equipment could be more robust. The dynamic nature of real-world multidomain operations necessitates proactive solutions that enable a flexible and continuous iterative process of systems to support CBRN missions.

The Chemical Corps could create a repository of mission templates that the force could field through the ATAK ecosystem. Mission results could be reported back to the Corps, and the Corps could learn from and iterate those results. This would create a continuous, iterative loop process decentralized to the unique mission context of each unit and doctrinally sound mission planning at scale.

Mission Planning Today

The Chemical Corps stands to gain an edge during the transition to multidomain operations in the large-scale combat operations of tomorrow. As focus shifts and doctrine is updated, current systems and processes must be able to adapt to the rapid changes of the battlefield. Efforts to address any shortfalls must include bridging gaps, enhancing readiness, and providing input for modernization efforts. The U.S. Army Combat Capabilities Development Command Chemical Biological Center, Aberdeen Proving Ground, Maryland, and the Defense Threat Reduction Agency, Fort Belvoir, Virginia, have published ATAK plugins for weather, navigation, and sensor support in CBRN environments.[2] While these efforts support the advancement and distribution of technology and tactics, techniques, and procedures, we can and must complete iterations at a faster pace.

The feedback loop for redesigning missions for hazard assessment platoons and other CBRN mission-focused entities is time-consuming and costly. Inefficiencies in adapting to change could have detrimental effects on our force. More quickly bridging the feedback loop could potentially result in more qualitative and quantitative data.

Failure to rapidly adapt doctrine and tactics, techniques, and procedures can be illustrated by the recent conflict of the second Nagorno-Karabakh War. Zhirayr Amirkhanyan's paper on the conflict highlights the devastating effect that Azerbaijan's integration of drone warfare technology had in both the air and ground domains of the conflict,[3] as Armenian forces failed to adapt to the new drone tactics, costing them crucial resources.

The Dragon Cave Solution

The concept of a "Dragon Cave" repository for CBRN mission planning is modeled after software package repositories. Units could access doctrinally sound mission templates that they adapted and executed, and then they could send the results back to the repository, where they would be reviewed and data would be adjusted to improve the templates. This

repository would ideally be maintained by the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS). As the U.S. Army continues to move toward data-centric operations, the Chemical Corps could leverage this emerging technology to gain a tactical edge from the field and deliver it to the wider Army.

For this concept to be successful, ATAK devices must be distributed to CBRN units. This would result in easy access for adapting doctrinal mission planning templates to their specific mission context. Features envisioned in this approach include the ability to track Soldier vital signs, Internet of Things-enabled self-contained breathing apparatuses, and CBRN equipment to enable real-time tracking and logging of mission metrics. Soldiers could connect to the broader Internet and send the mission metrics to a central source for review.

An artificial intelligence (AI) machine-learning model could be trained to review mission metrics and develop various performance optimizations and predictions. For example, based on a Soldier's fitness score, vital signs, distance walked, equipment carried, and stress indicators, an AI model could predict how long Soldiers of similar builds could function in self-contained breathing apparatuses and determine what equipment they could carry. For mission planning purposes, this data could help USACBRNS and other key stakeholders determine which devices to employ for what mission sets, how the devices operate, and the success rates of equipment down the line. From a logistical point of view, depending on upcoming missions and projected unit support for decontamination, the amount of fuel, water, and other resource support that a CBRN unit may need could be predicted.

The Dragon Cave could summarily unlock the future of CBRN mission planning and operations through data, which would then be distributed across units, commands, and USACBRNS to inform, support, and enable mission success. Continuous iteration and feedback would result in better products, which would directly impact Dragon Soldiers across all components.

Adaptive Mission Planning

Not all missions are the same across all contexts. One key Army concept involves empowering junior leaders, allowing them to adapt to changing conditions. While a central repository would provide a sound building block, Dragon leaders must still make command decisions that best suit mission requirements; conditions and situations vary across components and unit types.

Adaptability hinges on the critical thinking of officers, warrant officers, and enlisted Soldiers across the force. These Soldiers can be further enabled through possible suggestions (based on their current mission requirements) and AI learning models (based on historical data, including terrain, mission type, and Soldier information). A key feature of ATAK and its decentralized nature is that units could continue to function if they found themselves in a denied, degraded, or disrupted operational environment.

As mission data is returned to the Dragon Cave, a team could set up a pipeline to extract and transform data and train an AI model to improve templates and predicted mission success. These new mission templates would then be reviewed and approved by USACBRNS. Following the review stage, a new pipeline could be initiated and the mission templates could be uploaded, where they would then become available to all units.

Challenges and Considerations

Potential challenges and limitations abound with emerging technology. Some challenges associated with the concept of a central repository for CBRN mission planning include designating a central organization to maintain software, designating the approval authority for doctrinally sound mission templates, and managing the costs of devices to units. These challenges are not the sole responsibility of any one echelon; together, organizations are beginning to address the challenges across the Army and, more importantly, the DoD.

TAK implementation across the force is currently limited. The building blocks of the ecosystem continue to evolve and become prepared for wider distribution. Implementation of the Dragon Cave concept would also require that Soldiers be trained on the use of ATAK devices.

Designation of the appropriate organization for creating and maintaining the software is another challenge. With the help of organizations such as the U.S. Army Futures Command, possible solutions can be prototyped. These prototypes could then be used to help develop a longer-term solution. The current sensor suite upgrade package for the Stryker Nuclear, Biological, and Chemical Reconnaissance Vehicle (NBCRV)[4] is an excellent example of how the acquisition process can evolve to quickly and efficiently meet new requirements.

Another challenge is the central authority approval of doctrinally sound CBRN mission templates. USACBRNS recently opened a professional forum in which leaders and Soldiers across the force can ask subject matter experts questions on various CBRN-focused topics. USACBRNS stands to lead the way in data-centric mission planning, with a continuous feedback loop to improve and iterate doctrine.

Lastly, implementation costs money and time. Deciding how many devices are required and purchasing them for each unit necessitates further study of the most cost-effective means for these purchases. Training on the use and maintenance of the equipment and mission templates requires time. These challenges are not unique to the CBRN community.

Conclusion

The possibility of a Dragon Cave repository of mission templates could be an incredible win for the Chemical Corps. Leaning forward with regard to emerging technology in the face of the transition to large-scale combat and multidomain operations enables the Chemical Corps to lead a data-centric approach that aligns its strategies and unit

missions with operational data. With a central authority of doctrinal truth and coordination, future CBRN leaders will be able to more quickly adapt to missions with more understanding and, ultimately, with more lethality. The Chemical Corps must start and complete this innovative initiative to overmatch and win tomorrow's fight.

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("CBRN From a Global Perspective," continued from page 9)

Allied soldiers mark a toxic area with a sign in response to a simulated gas attack during an exercise.

ourselves into the conversations of senior leaders, develop trust, and guide discussions in such a way that our expertise can be exploited.

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Major Hurtado was the deputy CBRN officer for Headquarters, I Corps, and later transferred to JMRC. He holds a bachelor's degree in biological science from the University of Alaska, Fairbanks, and a master's degree in environmental management from Webster University.

Genetic Frontiers: Unraveling the Impact and Anticipating Future Challenges of SYNBIO

By Dr. Julie A. Preston, Captain Mithun P. Sheth, and Staff Sergeant Jonathan S. Sayles

In the evolving technological era of large-scale combat operations and multidomain operations, the U.S. Army is facing a most complex problem of simultaneously meeting and overmatching its competitors and enemies across multiple domains of warfare. Adding to this challenge, the People's Republic of China declared biology to be "a new domain of war" and announced plans to make China the global leader in technologies like genetic engineering.[1]

Advances in synthetic biotechnology, including gene-editing technologies such as clustered regularly interspaced short palindromic repeats (CRISPR), promise protection—and even cures—from diseases, but they also create new security risks. Research scientists can use CRISPR technology to selectively modify an organism's deoxyribonucleic acid (DNA) by incorporating foreign DNA into a living host cell. Five years ago, a Chinese scientist used CRISPR technology to create the first gene-edited babies, for which he faced international accusations of violating medical ethics. While this technology can potentially be used to cure genetic diseases, it also has the potential to edit bacterial or viral genomes to create enhanced pathogens. The 2022 "National Biodefense Strategy and Implementation Plan for Countering Biological Threats, Enhancing Pandemic Preparedness, and Achieving Global Health Security"[2] categorizes biological threats among the most severe threats to the United States and calls for bold approaches to transforming the Nation's biodefense program.

Due to the increasing ubiquity and simplicity of synthetic technologies, the chemical, biological, radiological, and nuclear (CBRN) profession and enterprise must be prepared to encounter its use on future battlefields. Raising awareness of this technology should begin in the classroom through modernization of the biodefense program of instruction to include information on synthetic biology (SYNBIO).

SYNBIO is a multidisciplinary field that is centered on creating and modifying organisms and their genetic material to produce novel phenotypic traits previously unseen in their natural predecessors. Advances in the field have allowed humankind to modify pathogens for desired functionality, resurrect eradicated viruses, and synthesize novel pathogens. Due to the technological advancement rate and the scope of application, SYNBIO poses a significant threat to national security. Advances in SYNBIO have created tools that could enable a state, group, or individual to produce novel viruses that are intentionally or unintentionally capable of impacting large groups of people.[3] Weapons resulting from SYNBIO would enable state actors to have a serious effect on an area—specifically, on the people, plants, and livestock in the area—while leaving critical infrastructure primarily untouched. For example, in 2002, scientists at Stony Brook University, New York, used SYNBIO to construct a live polio virus from genetic information publicly available on the Internet.[4] Using SYNBIO, scientists can also modify existing organisms so that they possess abilities they would not naturally exhibit, allowing potential adversaries to develop new or enhanced agents.[5] CRISPR is but one of several types of gene-editing technologies that allows for exact genome edits; it is so efficient and cost-effective that it has significantly increased the threat of SYNBIO to national security.

CRISPER is the most-discussed gene-editing technology during national and international security debates[6] because it does not require sophisticated knowledge, specialized equipment, or the time that was needed for earlier gene-editing technologies.[7] CRISPR uses a guide ribonucleic acid (RNA) strand to locate a desired target gene in the DNA, where enzymes cause a break in the double-stranded DNA, allowing the gene to be modified.[8] In short, scientists can cut and paste segments of DNA at desired locations within the genome. With CRISPR, any double-stranded DNA sequence in human cells and pathogenic invaders can theoretically be targeted. This allows for the technology to be used for beneficial purposes; and in December 2023, the U.S. Food and Drug Administration approved the first-ever gene-editing therapy for humans. CRISPR can now be used to treat sickle cell disease, a blood disorder caused by a single gene mutation.[9] However, gene-editing technology can also

be used for nefarious purposes—and CRISPR accessibility, affordability, and efficiency make it an attractive vehicle for biowarfare. Furthermore, CRISPR efficiency increases when paired with artificial intelligence, which can make use of machine learning to predict the effect of specific gene editing on an organism, avoiding time-consuming laboratory experiments and testing cycles.[10]

Because gene editing allows scientists to edit and shape whole genomes of bacteria and viruses with new properties,[11] concerns about its possible future use have been raised. U.S. scientists who were researching CRISPR modified the mousepox virus by inserting a gene for a natural immunosuppressant, originally intending to increase antibody production; instead, it turned off the part of the immune system that usually fights the virus, creating a more deadly form of mousepox.[12] These experiments suggest that it is possible to produce a smallpox variant that is resistant to the vaccines that are such an integral part of any deterrence strategy since vaccines reduce the incentive for adversaries to release certain agents by rendering attacks unsuccessful.[13]

CRISPR might also be used to edit genes of entire populations of disease-spreading animals, like mice and mosquitoes.[14] Researchers have attempted to modify the DNA of these animals so that future generations cannot spread disease. That objective is dangerously close to modification of their DNA so that future generations can more efficiently and effectively spread disease.

The implications of future use of these scientific advancements should be considered in terms of their significance to international security with regard to proliferation, deterrence, and unconventional weapon development. Several nations have engaged in covert biological weapons programs in the past,[15] and many nations openly conduct research that would be illegal in the United States. In the People's Republic of China, He Jiankui used CRISPR to edit genes in a human embryo in an attempt to create a baby that was immune to the human immunodeficiency virus (HIV); this sparked fears that he had opened the door to further embryo modification, such as the creation of "designer babies," for which parents could leverage gene-editing technology to select traits they value for their offspring.[16] Chinese scientists also used CRISPR to remove genes that inhibit muscle and hair growth in goats, successfully increasing yields of meat and wool.[17] Geneticist Denis Rebrikov, of the Pirogov Russian National Research Medical University, Moscow, Russia, plans to use CRISPR to genetically modify embryos to treat inherited deafness.[18] His research has been widely condemned as unethical, as these germline edits can be passed to future offspring. Despite the backlash, Rebrikov is still seeking approval to move forward.

Although China permits germline gene editing for research purposes, edited human embryos are not allowed to be used to establish a pregnancy. He Jiankui, therefore, spent 3 years in a Chinese prison for his embryo modifications that resulted in twin girls, but he has since been released. He is again working with CRISPR—this time in an attempt to cure Duchenne muscular dystrophy, a hereditary degenerative disease of the muscles. There are lingering concerns among experts about his motives as well as the motives of the Chinese government in allowing him to continue his research in the field.[19]

In addition to state-sponsored laboratories with the technology necessary to reengineer existing organisms or genomes for defined purposes, the affordability and accessibility of SYNBIO technology allows anyone with the right equipment and a crude laboratory to create a vaccine-resistant virus or make existing bacteria more dangerous.[20] They could even resurrect an eradicated virus, perhaps by turning the easily obtained cowpox virus into smallpox.[21] Because these gene-edited pathogens are unfamiliar, manifestations of these biothreats are unpredictable, creating additional monitoring and detection challenges.[22]

To further complicate matters, no international legal, ethical, or moral framework for determining a common understanding of the safe use of SYNBIO exists. Likewise, there is no international oversight committee for gene editing and no agreement on the ethical boundaries within which CRISPR may be used.[23] The Oviedo Convention on Human Rights and Biomedicine is the only legally binding international protocol that addresses gene editing; Article 13 of the Oviedo Convention allows gene editing for prevention, diagnosis, or treatment—but only if there is no modification in descendants' genes.[24] It prohibits the type of germline modifications that scientists in China and Russia are attempting to conduct. The Oviedo Convention, was not signed by the United States, China, or Russia.

With new technology comes the genuine possibility of new and more sophisticated threats. The field of SYNBIO has been expanding the possibilities of biowarfare for several decades, and recent advances in biotechnology are making it even easier to develop and use biological weapons. With the advent of more-straightforward, cheaper, and more-accessible gene-editing technology like CRISPR, the danger has become more urgent. This will undoubtably expand the scope and diversity of the biological threat landscape. In order to help the Department of Defense (DoD) achieve and maintain its biodefense goals, our defense capabilities must evolve alongside these changes. The *2023 Biodefense Posture Review*[25] calls for the modernization of operations to sustain readiness and resilience against burgeoning threats. We must implement the plan outlined in the *National Biodefense Strategy* by pursuing innovative approaches, encouraging learning, and linking stakeholders with new tools and ideas,[26] starting with our student Soldiers at the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS), Fort Leonard Wood, Missouri. When a CBRN Soldier understands that there may be altered or combined biological threats, then he or she realizes the limitations that can be imposed by traditional knowledge of diseases and, thus, can provide more flexible and dynamic recommendations to ground force commanders.

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Staff Sergeant Sayles is a CBRN advanced individual training biological operations instructor at USACBRNS. He is pursuing an associate's degree in counterterrorism from the American Military University.

Experiences of Lieutenants in Korea

By Second Lieutenant Max Z. Liang, First Lieutenant Jordan D. Ashley, First Lieutenant Dymon D. Brown, and First Lieutenant Alyssa D. Powell

An officer's first unit of assignment is critical to his or her personal and professional development. New officers experience fundamental positions of leadership, gain staff understanding, and set the foundations for their future careers in their first units. No other location offers as many opportunities for newly assigned chemical, biological, radiological, and nuclear (CBRN) officers to serve in leadership and staff positions as the Republic of Korea, which includes a wealth of positions with geopolitical impacts on the U.S. Department of Defense and its Allies.

Newly assigned CBRN officers fill a variety of positions throughout the Korean peninsula. Many second lieutenants are assigned to battalion or brigade staffs, where they learn the fundamental aspects of the orders-based U.S. Army. Staff assignments are available in a myriad of unit types, including, but not limited to, aviation, field artillery, military intelligence, and engineer. CBRN staff officers are immersed in the military decision-making process; they can leverage their CBRN knowledge to provide critical input and recommendations to their commander while operating in CBRN conditions.

Some officers are assigned to leadership positions in the 23d Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Battalion, Camp Humphreys, Korea—the only forward-stationed CBRNE battalion in the U.S. Army. As platoon leaders in heavy decontamination, mounted reconnaissance, or hazard assessment platoons, junior officers, with the guidance of platoon sergeants, lead approximately 30 Soldiers. In chemical, biological, radiological, nuclear, and explosives response teams (CRTs), junior officers lead teams of approximately 13 individuals on highly technical CBRNE missions.

Officers of the 501st CBRNE Company (Technical Escort), 23d CBRNE Battalion, Camp Humphreys (ranging from a newly assigned second lieutenant to experienced staff lieutenants serving as company CRT leaders and executive officers), have compiled their individual experiences from their own perspectives and the unique cultural positioning of Korea. Hopefully, by sharing their experiences, they can persuade more incoming CBRN lieutenants to embrace these challenging and rewarding assignments.

Second Lieutenant Max Z. Liang (CRT Leader)

The responsibilities and challenges of serving as a CRT leader in Korea are exhilarating and demanding. The Korean peninsula offers a unique setting for military service, blending the rich history of the region with the geopolitical complexities of present day. Stepping into the role of a CRT leader in Korea involves leading Soldiers and navigating the cultural nuances and strategic considerations that define the Korean theater.

My days begin with the crisp morning air of the Korean landscape, conducting physical training with my team as the sun rises over the horizon. The commitment to physical fitness is not only a personal pursuit but also a crucial element in fostering the resilience and readiness of the unit. Following physical training, the focus shifts to mission planning and coordination. Given the political tension on the Korean peninsula, maintaining a high level of readiness is paramount. Training exercises simulate real-world scenarios, preparing us for any eventuality that may arise in this dynamic and strategic environment.

Cultural immersion is a constant aspect of my experience as a leader in Korea. I lead and work closely with Korean Augmentation to the U.S. Army (KATUSA) soldiers. This provides a unique opportunity for me to learn about Korean culture, customs, and military practices; expand my knowledge of international affairs; and develop my leadership skills by managing a diverse team with different cultural backgrounds and perspectives. Interacting with members of the local communities and building positive relationships with them are essential components of the mission. Whether participating in combined exercises with the Republic of Korea Army or engaging in community outreach, the diplomatic role of a second lieutenant in Korea offers valuable professional and personal growth.

Despite the inevitable challenges, my unit has a strong sense of camaraderie and the bonds forged with fellow officers, noncommissioned officers, and enlisted Soldiers are vital to mission success. The resilience, adaptability, and discipline instilled through our experiences contribute not only to the effectiveness of our military unit but also to our personal and professional growth.

Serving as a second lieutenant in Korea is a dynamic and fulfilling journey, shaped by the unique blend of military service, cultural immersion, and strategic significance on the global stage.

First Lieutenant Jordan D. Ashley (Company Executive Officer)

As a company executive officer in Korea, I work in a challenging and dynamic environment. The role requires a deep

understanding of the nuances of operating as an executive officer under CBRN conditions as well as the ability to effectively lead a team. I have learned the importance of quick and efficient decision making, strong communication skills, and the need to prioritize the safety of team members.

The KATUSA Soldier Program makes my assignment in Korea unique. My experience in working with KATUSAs, who are soldiers conscripted and assigned to augment U.S. Army units, has been a pivotal chapter in my military career. The partnership between U.S. forces and KATUSAs is founded on mutual respect, shared goals, and a commitment to fostering strong military cooperation. The collaboration between the two countries showcases the strength of our alliance and underscores the power of cross-cultural teamwork. Serving alongside U.S. forces, KATUSAs bring a unique perspective and skill set to the team. Understanding and embracing the cultural nuances is essential in creating a cohesive and effective working relationship.

First Lieutenant Dymon D. Brown (CRT Leader)

I have been stationed at Camp Humphreys, South Korea, for 2 years. During that time, I have served as a battalion CBRN officer, land and ammunition manager, and unit status report coordinator for the 4th Aerial Reconnaissance Battalion (Attack), 2d Aviation Regiment. I currently serve as a CRT leader with the 501st CBRNE Company, 23d CBRNE Battalion; but with 1 year remaining on my assignment in Korea, I am looking forward to serving as the company executive officer so that I can develop my leadership and decision-making skills.

Korea is an excellent place for lieutenants to learn, develop, and become groomed professional leaders in today's Army. I have forged close bonds with my senior leaders and peers, who are always willing to lend an empathic ear and offer guidance. Using their guidance, I have successfully trained and developed my Soldiers with regard to critical individual and team tasks while also meeting my commander's intent. My time as a CRT leader with the 501st CBRNE Company has taught me the importance of being a competent and proactive leader.

Being stationed in Korea has allowed me to develop professionally and to travel to Thailand, Vietnam, and Guam. I have enjoyed learning about different cultures and ways of life, which has widened my perspective. I genuinely appreciate the opportunities and experiences I have had while serving in Korea.

First Lieutenant Alyssa D. Powell (CRT Leader)

Serving as a team leader in a technical escort company in Korea has been challenging and fun. Because I was new to the Army, the operational tempo was high, and the assignment was short (with a 1-year timeline), training the unit to be proficient required the art and science of managing. However, in Korea I have learned the importance of time management, the need for a good training plan, and ways to learn from the leadership experiences around me.

One of the best features of a CRT is that the leadership structure is top-heavy. As a new lieutenant, I have had to learn a lot about CRT missions and functions in a short amount of time. At times, this task has seemed daunting, but many leaders have provided valuable input to my professional development. Numerous team sergeants, peer lieutenants, and warrant officers have provided valuable resources and help along the way. I have become aware of the importance of continually learning from the Soldiers around me and not being afraid of making mistakes. While Korea may not be every Soldier's preferred assignment, I am thankful that I have had the opportunity to lead a CRT and learn from the leaders around me.

Conclusion

Despite the challenges faced by new lieutenants, there are opportunities to learn, train, explore, and grow as people and Soldiers while stationed in Korea. There is not one specific thing that would make Korea the best assignment location—rather, many aspects make an opportunity in Korea worthwhile. The combination of being assigned to a geopolitically significant location where CBRN operations are critical, training with allies and joint partners, facing demanding leadership challenges, and benefiting from the opportunity for personal travel is genuinely unique to an assignment to Korea. A remarkable legacy is being built on the peninsula every day, and it is an honor to contribute to that legacy.

Vipers! Lion Up!

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First Lieutenant Powell is currently a student in the CBRN Captain's Career Course. She is assigned as a CRT leader for the 501st CBRNE Company, 23d CBRNE Battalion. She holds a bachelor's degree in political science from Belmont University, Nashville, Tennessee.

AWAY FROM THE FLAGPOLE

By Captain Seth A. Banano

The mission set of the Chemical Corps, a relatively small branch within the U.S. Army, is defensive and reactive in nature. Chemical, biological, radiological, and nuclear (CBRN) Soldiers patiently wait for the worst but hope that it never happens. CBRN positions that are attached to CBRN units, whether teams, platoons, companies, or battalions, are very limited in number and are often coveted. They are not easily accessible, and Soldiers who get these positions are considered "lucky." So how do CBRN Soldiers effectively immerse themselves into today's Army if they are not attached to a unit with a strong CBRN presence?

Advantages of a Strong CBRN Presence

There are many advantages for CBRN Soldiers who are assigned to large military installations such as Fort Leonard Wood, Missouri; Joint Base Lewis-McChord, Washington; Fort Bliss, Texas; Fort Cavazos, Texas; or Fort Stewart, Georgia. There is a very strong CBRN presence at these locations, which ensures easier access to professional development and subject matter experts (SMEs), while CBRN leadership and other available resources are also nearby. Being stationed at any of these locations means that CBRN Soldiers have access to CBRN experts and leaders. Regardless of the unit to which a CBRN Soldier may be attached, these locations offer ample opportunity to access and develop the skills necessary to effectively perform CBRN duties.

Large military installations with a strong CBRN presence allow Soldiers to be part of unique units such as infantry brigade combat teams and/or CBRN reconnaissance platoons, which are specifically designed to be agile and fast-moving while on foot. These unique and often coveted positions provide an enriching experience for CBRN Soldiers, and units are effective at immersing Soldiers into maneuver units. CBRN Soldiers must continue to develop the skills, knowledge, and expertise necessary to effectively perform their duties for these special units.

Being stationed away from these specialized CBRN units requires that CBRN Soldiers focus their efforts on integration into movement and maneuver warfighting functions; as a result, they would need to develop and expand their CBRN knowledge and experience in the field.

Limitations for CBRN Soldiers

Where CBRN leaders are absent and CBRN units are limited, it becomes increasingly challenging to complete CBRN training and maintain readiness. At smaller installations, efforts are focused more on Army-based skills that are not specific to the CBRN arena. In these cases, CBRN Soldiers are at a disadvantage. Their opportunities to gain knowledge in the field are limited, and their ability to learn about CBRN-specific military occupational specialty tasks and equipment is significantly impacted.

Taking command of a headquarters company when no options for commanding a CBRN company exist can be detrimental to a CBRN officer, limiting his or her overall knowledge of CBRN. CBRN Soldiers who are assigned to positions with little to no CBRN oversight are often at the mercy of the larger unit to which they are attached. In these units, CBRN Soldiers are often assigned and limited to positions such as staff noncommissioned officers (NCOs) and operations clerks and/or given additional duties such as the responsibility for keeping the CBRN cage intact.

Battalion and brigade CBRN officers and NCOs can only do so much in terms of CBRN training. Unfortunately, CBRN training and expertise are low priorities for these units, despite how much the brigade CBRN officer may disagree. CBRN leaders often resort to fitting CBRN tasks and drills into the overall mission directed by the brigade or division. In terms of completing mission-essential tasks, this approach is sufficient. The problem is: Where and how do CBRN Soldiers and leaders expand their CBRN knowledge and capabilities?

The Chemical Corps has long struggled with effectively dividing and sharing the experiences that CBRN Soldiers receive once they leave training at Fort Leonard Wood. Assignments to locations like Joint Base Lewis-McChord allow CBRN Soldiers to be fully integrated into areas for which they are trained. But in reality, those opportunities are limited and Soldiers are often sent to locations with no CBRN presence at all. This creates a gap between their education and MOS-specific abilities. Beyond organizational training changes at a high level, the Chemical Corps must find ways to better incorporate CBRN Soldiers who find themselves away from CBRN units.

Integration of Troops Through Example

What happens to Soldiers and leaders when they're not serving in a staff role? For example, as a CBRN lieutenant, there is no requirement to serve as a platoon leader or an executive officer if those positions are not available. Therefore, it is possible to serve as a CBRN battalion officer with little to no experience at the platoon or company level.

It is also possible for officers such as CBRN captains to be assigned to duty stations without a CBRN company. These

Soldiers often serve as brigade staff officers prior to taking command of the headquarters company; however, there are often very few options for taking command of a CBRN unit.

The disadvantages faced by the CBRN Soldier necessitate a change in order for the troops to be effectively integrated. Other units, such as those of the Engineer Corps, lead by example with regard to the successful integration of troops. Engineers have found a way to become an equal contributor for their infantry counterparts. The first step in making a change for the Corps is to develop a stronger esprit de corps among CBRN Soldiers and leaders.

Pride in the Chemical Corps

There are several ways to strengthen the ability of CBRN Soldiers to effectively integrate into the Army. Although the Engineer Corps often faces similar issues with integration capabilities, there is a major difference between the Engineer Corps and the Chemical Corps; engineers sell their capabilities and incorporate themselves into units.

The CBRN culture could be improved by better facilitating pride with regard to CBRN development capabilities. This is more effectively achieved when the CBRN Soldier has the support and backing of other CBRN units, regardless of unit location. The Chemical Corps cannot change its mission set, but it can and should influence how the CBRN Soldier is integrated into the Army. Regardless of the size of the CBRN footprint at any one location, it is increasingly important that CBRN Soldiers be integrated into units.

Conclusion

Although the Chemical Corps may be a niche group, it does play an important role in the Army. Chemical Corps priorities and responsibilities can vary from one duty location to another. In locations with little to no CBRN presence, Soldiers are unable to effectively learn CBRN-specific skills, potentially affecting their morale.

The Chemical Corps is currently unlikely to expand or alter its force composition, so it is becoming increasingly important to explore other areas for growth. One way to achieve this would be to promote CBRN capabilities to leaders at every level. If the brigade or division leadership is not sufficiently convinced of the importance of CBRN Soldiers to continue to develop military occupational specialty-specific training, then such training must be prioritized by the Chemical Corps. The Chemical Corps must sell the importance of the CBRN Soldier capability to the Army.

As CBRN Soldiers, we cannot change our mission set; however, we can change how we perceive and integrate ourselves.

Captain Banano is a CBRN officer currently attending the CBRN Captain's Career Course at Fort Leonard Wood. He holds a bachelor's degree in criminal justice from Stephen F. Austin State University, Nacogdoches, Texas.

Operationalizing CBRN Core Functions

By Major Derek E. Taylor

This article presents a brief description of the role of chemical, biological, radiological, and nuclear (CBRN) staff officers in the operations process. It summarizes the operations process, introduces the CBRN core functions, explains how to operationalize these core functions within the operations process, and highlights the critical CBRN staff contributions that take place during mission planning to help commanders develop hazard awareness and understanding.

Operations Process

The U.S. Army conducts multidomain operations to create and exploit relative advantages in order to achieve objectives, defeat enemy forces, and consolidate gains on behalf of joint force commanders.[1] The Army framework for organizing and activating command and control is referred to as the operations process (see Figure 1).[2]

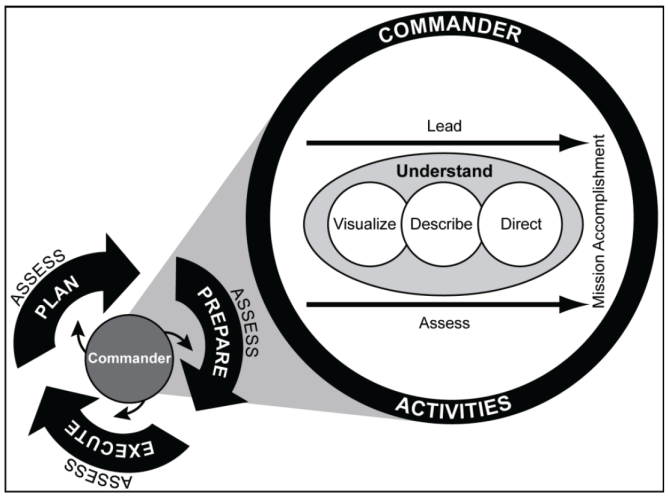


Figure 1. Operations process

Commanders use the operations process to drive the conceptual and detailed planning necessary to understand an operational environment; visualize and describe the desired end state of the operation and the operational approach; make and articulate decisions; and direct, lead, and assess operations.[3] Each operational environment has unique characteristics and challenges for which commanders must account. One example is a CBRN environment.

CBRN environments are operational environments that include CBRN threats and hazards and their potential effects.[4] CBRN threats and hazards may shape the operational environment, disrupt lines of communication, reduce operational tempo, and degrade combat power. Additionally, CBRN operational environments may influence local populations and require increased integration with joint, interagency, multinational, and local authorities. Commanders conduct CBRN operations to address these challenges.

CBRN operations refers to "the employment of capabilities that assess, protect against, and mitigate the entire range of [CBRN] incidents to enable freedom of action."[5] These three actions of assess, protect, and mitigate constitute the CBRN core functions. Incorporating the CBRN core functions into the operations process allows commanders to prevail during CBRN operations.

CBRN Core Functions

Assessing threats and hazards is a continuous process that facilitates proactive decision making. Assessing threats and hazards includes—[6]

- Evaluating current hazards.
- Identifying potential threats and hazards.
- Evaluating current vulnerabilities.
- Understanding current capabilities.
- Modeling potential effects.

Protection against CBRN threats and hazards encompasses the execution of physical defenses to negate the effects of CBRN hazards on—[7]

- Personnel.
- Equipment.
- Installations.
- Facilities.
- Infrastructure.

Mitigation encompasses the planning and actions taken to prepare for, respond to, and recover from contamination associated with CBRN threats and hazards in order to continue military operations.[8] Tasks associated with mitigation include—[9]

- Defeating, disabling, or disposing of weapons of mass destruction.
- Providing scalable responses to CBRN incidents.
- Supporting reconnaissance and decontamination operations.

Commanders at every echelon possess the ability to perform the three CBRN core functions; however, CBRN forces provide commanders with an enhanced capability to perform these functions. When they incorporate CBRN core functions into the operations process, commanders gain the hazard awareness and understanding needed to make sound decisions in CBRN environments.

Core Functions and the Operations Process

The operations process consists of four main activities—planning, preparing, executing, and assessing. These operations process activities are not discrete; they overlap and recur as circumstances demand (see Figure 2).

During planning, the CBRN staff conducts assessments, creates a CBRN defense plan, and models potential incidents. The result is a CBRN defense plan that is integrated with the broader mission and published in an operations order annex.[10] While planning may initiate an iteration of the operations process, planning does not stop with the production of an order. After completing the initial order, the commander and staff continuously revise the plan as needed, based on changing circumstances.

Preparation for a mission often begins early during planning. To prepare, CBRN staff may recommend employing intelligence, surveillance, and reconnaissance assets to answer priority intelligence requirements.[11] Additionally, subordinate units may need to check protective equipment and detectors, increase their protective posture, and conduct rehearsals. Rehearsals play an important role, as tactics, techniques, and procedures may vary during the execution of missions in CBRN environments. Finally, preparation for a follow-on mission may overlap with execution of the current mission.

Mission execution involves implementing the CBRN defense plan. Commanders assess progress and adjust the plan based on their situational understanding. CBRN defense plan tasks may include employing assets for reconnaissance, surveillance, exploitation, or decontamination. They may also include implementing targeting plans against threat units and infrastructure to reduce the likelihood of CBRN weapon employment. Real-time information sharing through warning and reporting systems helps units to avoid hazards, staffs to quickly process CBRN support requests, and commanders to appropriately assess the situation and prioritize units to receive CBRN support.[12]

Assessing is a continuous activity that influences the other three operations process activities.[13] It involves the integration of CBRN staffs and process working groups during mission planning steps.[14] CBRN reports provide input for future assessments and valuable insight into the success of CBRN defense plans.

Mission Planning

Most tactical-level staffs employ the military decision-making process, which is an iterative planning methodology used to understand the situation and mission, develop a course of action, and produce an operation plan or order. Through the military decision-making process, the staff helps the commander make informed decisions and synchronize those decisions into a fully developed plan or order.[15]

Throughout the decision-making process, staff officers prepare recommendations using accurate information and assessments obtained from updated running estimates

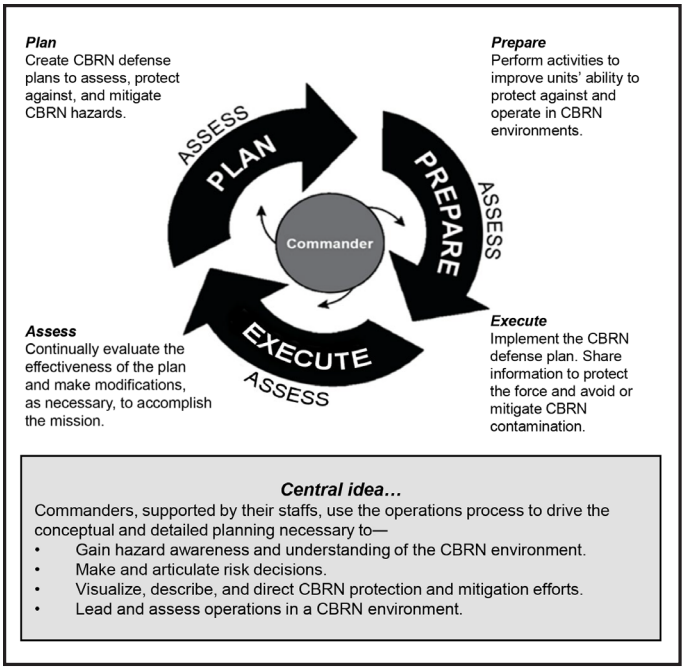


Figure 2. Operations process in a CBRN environment

within their functional areas of expertise.[16] CBRN staff officers contribute to the steps of the military decision-making process by—

- Updating CBRN running estimates.
- Conducting CBRN assessments.
- Developing an initial CBRN defense plan.
- Modeling potential incidents.
- Publishing the final CBRN defense plan as an annex to the operations plan or order.

Figure 3 (page 22) shows how these contributions align with each step of the military decision-making process and the CBRN core functions.

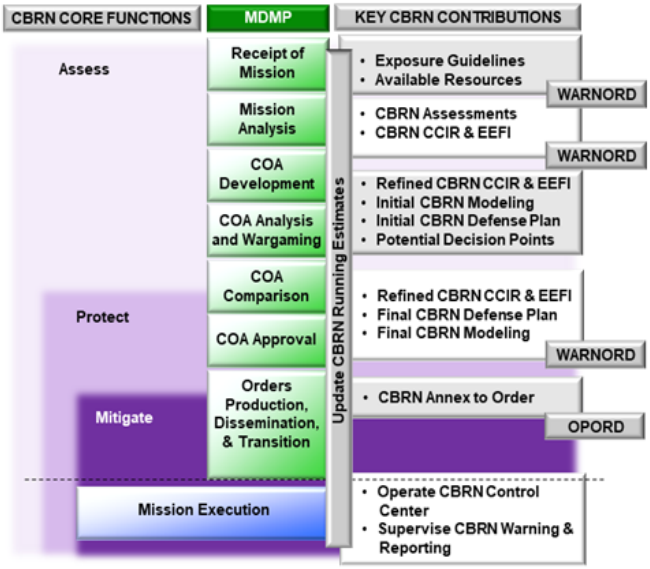
Hazard Awareness and Understanding

When properly integrated into the operations process, CBRN staffs help commanders gain hazard awareness and understanding. Commanders use this awareness and understanding to—

- Assess the operation.
- Articulate risk decisions.
- Visualize, describe, and direct CBRN protection and mitigation efforts.
- Lead the operation toward stated objectives.

Commanders and staffs use several integrating processes to adapt to changing circumstances throughout the operations process.[17] Key integrating processes include—

- Intelligence preparation of the operational environment.
- Targeting.
- Knowledge management.
- Information collection.
- Risk management.



CBRN—chemical, biological, radiological, and nuclear
COA—course of action
CCIR—commander's critical information requirement
EEFI—essential element of friendly information
MDMP—military decision-making process
WARNORD—warning order

Figure 3. CBRN contributions during mission planning

When CBRN staffs align integrating processes, unit battle rhythm events, and CBRN core functions, they contribute to improved hazard awareness and understanding throughout the operations process (see Figure 4). Ultimately, hazard awareness and understanding enables commanders to execute their portion of the operations process and prevail in CBRN environments.

Conclusion

By incorporating the CBRN core functions of assessing, protecting, and mitigating into the operations process, commanders gain hazard awareness and understanding, which ultimately enables them to visualize, describe, direct, assess, and lead their formations toward mission accomplishment and to prevail during CBRN operations.

Endnotes:

[1]Field Manual (FM) 3-0, *Operations*, 1 October 2022.

[2]Army Doctrine Publication (ADP) 5-0, *The Operations Process*, 31 July 2019.

[3]Ibid.

[4]Joint Publication (JP) 3-11, *Operations in Chemical, Biological, Radiological, and Nuclear Environments*, 28 October 2020.

[5]FM 3-11, *Chemical, Biological, Radiological, and Nuclear Operations*, 23 May 2019.

[6]Ibid.

[7]Ibid.

[8]JP 3-11.

[9]FM 3-11.

[10]Ibid.

[11]Ibid.

[12]Ibid.

[13]ADP 5-0.

[14]FM 3-11.

[15]ADP 5-0.

[16]FM 5-0, *Planning and Orders Production*, 16 May 2022.

[17]ADP 5-0.

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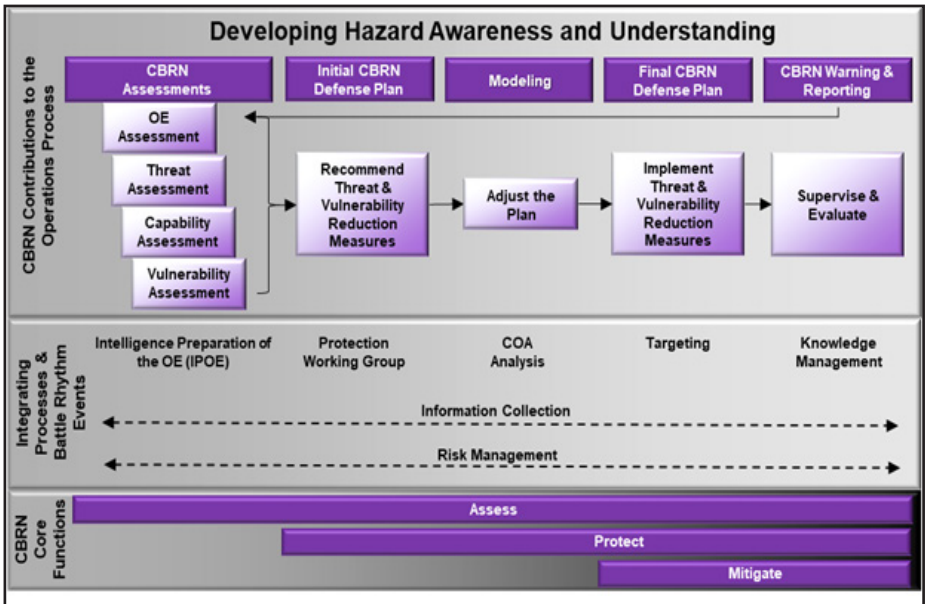

Legend:
CBRN—chemical, biological, radiological, and nuclear
COA—course of action
IPOE—intelligence preparation of the operational environment
OE—operational environment

Figure 4. Development of hazard awareness and understanding

BEYOND THE BRICKS:

NAMES AND STORIES BEHIND THE ENGRAVINGS

By Ms. Christy L. Lindberg

While preparing for an 11 September 2014 Operation Iraqi Freedom/Operation Enduring Freedom Monument dedication ceremony to be held in the Chemical Corps Memorial Grove, Fort Leonard Wood, Missouri, Brigadier General Maria R. Gervais, then commandant of the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS), Fort Leonard Wood, asked the question: "Do we have a complete list of all of our fallen chemical, biological, radiological, and nuclear (CBRN) Soldiers?" At that time, the answer was no. But nearly 8 years later, with generous donations of time and money from many current and former CBRN Soldiers, the funding, research, compilation, editing, and verification necessary to generate a list and engrave bricks with names of fallen CBRN Soldiers was completed. In November 2022, the bricks were dedicated in the Memorial Grove.

This article highlights some of our fallen, representing every major conflict involving the Chemical Warfare Service and Chemical Corps and revealing their stories beyond the engravings on the bricks.

World War I

Second Lieutenant Joseph T. Hanlon

Second Lieutenant Joseph T. Hanlon, Company B, 1st Gas Regiment, American Expeditionary Force, was the first chemical officer killed in battle when he was mortally wounded on 30 July 1918 near Villers-sur-Fere, France. On 30 August 1918, the Services of Supply Office, Chief of Chemical Warfare Section, American Expeditionary Forces Headquarters, honored Lieutenant Hanlon with the following:

"I. Hereafter, the experimental field, Chemical Warfare Service, will be known as 'Hanlon Field,' Chemical Warfare Service, in honor of Lieutenant Joseph Hanlon, Company B, 1st Gas Regiment, who was killed in action 30 July 1918, near Villers-sur-Fere while engaged in conducting a carrying party to the site of a proposed stokes mortar operation in support of an infantry attack when the Germans were being driven back from the Marne to the Vesle.

II. Lieutenant Hanlon was an officer of unusual promise, extraordinary ability, high ideals, and every inch a Soldier, and he was loved by all who knew him. In his death, the Service suffered a severe loss. As the experimental field typifies the very soul of the Chemical Warfare Service in its various activities, it is most fitting that it should bear the name of one who, in his youthful life, typified all that is good in the Service."

In 2017, the 84th Chemical Battalion Headquarters, Fort Leonard Wood, was also dedicated to Lieutenant Hanlon.

Sergeant Major Joseph Snelsire

Sergeant Major Joseph Snelsire, 1st Battalion, 1st Gas Regiment, American Expeditionary Force, participated in five campaigns during World War I. After surviving 6 months of combat and seeing the end of the war, Sergeant Major Snelsire died of pneumonia during the Great Influenza Pandemic of 1919.

World War II

701st Chemical Maintenance Company (Aviation)

In November 1943, a seven-man detachment from the 701st Chemical Maintenance Company (Aviation), Chemical Warfare Service—a unit trained in the movement, storage, maintenance, handling, and loading of aerial chemical munitions—boarded the *SS John Harvey* "liberty ship," bound for Bari Harbor, Italy. The cargo consisted of more than 5,000 tons of munitions, which included as many as 24,000 M-47 mustard agent bombs.

On the evening of 2 December 1943, the harbor at Bari was full of Allied ships queued up to unload their cargo, providing a target-rich environment for German bombers. The Germans took advantage of the situation by coordinating a massive air bombardment. Many crewmen immediately abandoned their ships; however, observers noted that, as the attack raged on, the crew of the *SS John Harvey*, including the members of the 701st, tirelessly worked for hours, fighting fires and attempting to prevent the loss of their ship and its cargo.

The seven members of the 701st Chemical Maintenance Company detachment sacrificed their lives in service to the Nation on 2 December 1943:

- First Lieutenant Howard Dale Beckstrom.
- Sergeant Broadus J. Jamerson Jr.
- Private First Class Bennie G. Taylor.
- Private First Class Charles E. Thompson.
- Private First Class Fred Wilson.
- Private Wilson Brodie.
- Private Willie Tensley.

Tragically, the entire crew of the *SS John Harvey* was lost when the ship exploded. Sadly, none of the members of the 701st were recovered.

LST-422 83d Chemical Mortar Battalion

26 January 1944 was the darkest day in Chemical Corps history. At 0100 that day, Landing Ship Tank (LST)-422, which was designed to carry large cargo and land it directly on the beach without the need for docks or piers, was fighting high seas and gale force winds as it approached the Allied beachhead at Anzio, Italy. Companies C and D and the Headquarters Company, 83d Chemical Mortar Battalion—along with unit vehicles, mortars, and ammunition as well as hundreds of 55-gallon drums of fuel for the vehicles already in combat on the Anzio battlefield—were on board.

Twelve miles from the Anzio beachhead, the LST-422 struck a German sea mine. The explosion opened a huge hole in the hull of the ship and ignited the drums of fuel, triggering additional explosions of the mortars and ammunition. The fire and explosions trapped most of the chemical Soldiers below deck, and they were unable to escape as the ship burned and sank. In all, 289 members of the battalion were lost, which is, by far, the greatest single-day loss in the 100-year history of the Chemical Corps. Sadly, most of the bodies were never recovered; and until November 2022, no memorial existed.

Korean Conflict

Master Sergeant Hugh D. Whitacre

On 25 November 1950, Chinese Communist forces attacked en masse along the U.S. Eighth Army front on both sides of the Ch'ongch'on River in northwestern North Korea. The 2d Infantry Division and supporting units were vastly outnumbered and forced to conduct fighting withdrawals to the south in order to prevent Chinese flanking maneuvers. During the beginning of their offensive, Chinese troops overran some of the artillery and mortar units that were in positions along the river.

Master Sergeant Hugh D. Whitacre

Master Sergeant Hugh D. Whitacre, who had entered the Army from Maryland and was serving with Company C, 2d Chemical Mortar Battalion, 2d Infantry Division, was killed in action by enemy forces on 26 November while 2d Infantry Division units were defending the Ch'ongch'on River line. His remains were not recovered, and he is still unaccounted for. Today, Master Sergeant Whitacre is memorialized on the Courts of the Missing at the National Memorial Cemetery of the Pacific, Honolulu, Hawaii. His name is also inscribed on the Korean War Veterans Memorial in Washington, D.C., which was updated in 2022 to include the names of the fallen.

Vietnam War

Captain Wayne H. Kidd

Captain Wayne H. Kidd, Chemical Corps, distinguished himself by a heroic action while engaged in military operations against an opposing armed force in Vietnam on 11 December 1964. As a subsector advisor in a province in the Republic of Vietnam, Captain Kidd demonstrated grit and perseverance in his efforts to prevent a Vietnamese town from being overrun by a Viet Cong battalion. Captain Kidd had estimated the Viet Cong buildup in the area and had requested reinforcements from higher headquarters for the defense of the town, which was protected only by a small force; however, the enemy launched an attack before support arrived.

Captain Wayne H. Kidd

In contacting higher headquarters for air strike support, Captain Kidd bravely left his covered position, exposing himself to small-arms and mortar fire. He then moved to the bunker of the district chief, who informed him that evacuation was possible via the road. Although he was allowed to leave the combat zone, Kidd remained in the area to advise the district chief and maintain contact with the aircraft when it arrived. He continued his courageous efforts throughout the hazardous situation until he was mortally wounded by the enemy. Captain Kidd was the first Chemical Corps Soldier killed in Vietnam. His heroic conduct reflects distinct credit upon himself and the U.S. Army. Captain Kidd is interred in Greenlawn Cemetery, Clarksburg, West Virginia, and is remembered on Panel 01E Line 076 of the Vietnam Veterans Memorial.

Specialist Five James D. Valov

Specialist Five James D. Valov

Specialist Five James Damion Valov began his service in Vietnam on 8 March 1969. He was a chemical staff specialist assigned to the 26th Chemical Detachment, 1st Cavalry Division (Airmobile). At the time of his death, he was attached to Company B, 1st Battalion, 5th Cavalry, as part of a tunnel and bunker contamination team.

On 25 April 1969, Specialist Five John Thiel (team leader) and Specialist Five Valov left landing zone (LZ) Dolly by helicopter to contaminate a small bunker complex that Company B had discovered about 8 kilometers southeast of LZ Dolly. The original plan was to return to LZ Dolly that afternoon, but the tactical situation changed, requiring the team to remain with Company B in the triple-canopy jungle overnight. Shortly after midnight, the enemy fired mortars on the company night position, wounding several men, including Specialist Five Thiel, and killing the company commander, Captain Charles W. Chandler, and Specialist Five Valov. Specialist Five Valov is interred in the Russian Molokon Cemetery in Commerce, California, and is remembered on Panel 26W Line 059 of the Vietnam Veterans Memorial.

A few of the memorial bricks from the Chemical Corps Memorial Grove

Gulf War

Specialist Kenneth J. Perry

Specialist Kenneth J. Perry, a member of the 12th Chemical Company, 1st Infantry Division (mechanized), was killed in southwestern Kuwait when a bomb exploded while he was surveying shrapnel for signs of chemical residue. In his last letter to his sister, Perry said that the troops needed to be there and that he wanted to "liberate Kuwait."

Global War on Terror

Sergeant First Class Mickey E. Zaun

Sergeant First Class Mickey E. Zaun

Sergeant First Class Mickey E. Zaun was a chemical operations specialist with the U.S. Army Special Operations Command, Fort Bragg, North Carolina. On 28 January 2005, he died from injuries sustained in a collision between two armored vehicles in Mosul, Iraq.

Specialist Krystal M. (Alvarado) Fitts

Specialist Krystal M. (Alvarado) Fitts died on 17 July 2012, in Kandahar, Afghanistan, from injuries suffered from indirect fire. She was assigned to the 1st Battalion, 508th Parachute Infantry Regiment, 4th Brigade Combat Team, 82d Airborne Division, Fort Bragg, North Carolina.

Specialist Krystal M. (Alvarado) Fitts

Specialist Fitts was motivated, tenacious, and dedicated. Military officials stated that she filled a critical role in her unit and that she took on duties well beyond the scope of her training. She learned the Pashtu language to help her fellow Soldiers communicate with local citizens.

Conclusion

These are but a few of the stories behind the memorial bricks at the Chemical Corps Memorial Grove. Each of the 1,813 bricks honors the service and sacrifice of our fallen CBRN Soldiers. In the words of poet Laurence Binyon:

"They shall grow not old,

As we that are left grow old: Age shall not weary them, nor the years condemn.

At the going down of the sun and in the morning.

We will remember them."[1]

Editor's note: Dr. John Thiel was the benefactor of the memorial bricks in the Chemical Corps Memorial Grove. Dr. Thiel served two tours in Vietnam and was medically retired as a staff sergeant in 1971. Today, Dr. Thiel remains a steadfast contributor to the legacy and incredible history of the Chemical Corps by ensuring that those who made the ultimate sacrifice will never be forgotten. His hobby is developing and preserving the histories of the units with which he served in Vietnam.

Endnote:

[1]Laurence Binyon, *For the Fallen*, 1914, <https://www.poetryfoundation.org/poets/laurence-binyon>, accessed on 29 February 2024.

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