

**Chemical Defense
Training Facility**
celebrates 10th anniversary.
See page 12.



Commandant **MG Ralph G. Wooten**

Editor **Gloria Helm**
Assistant Editor **Mattie Kirby**
VIS **Kathie Troxell**

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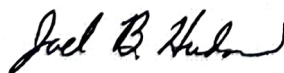
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Official:
JOEL B. HUDSON



Administrative Assistant to the
Secretary of the Army
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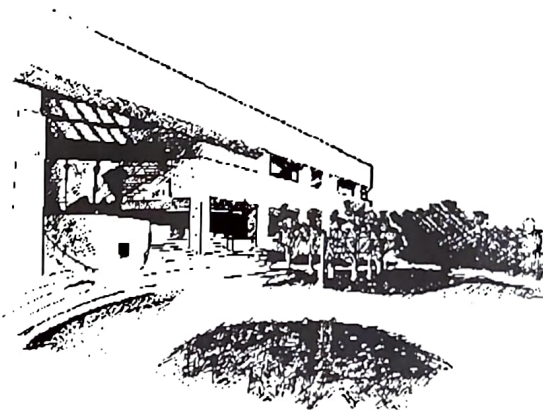
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Chief of Chemical



It was great to see so many of you at the Worldwide Chemical Conference. For those who could not make it, you missed the best one ever. As I reflect back, the thing that impressed me most was the diversity of topics we discussed. From the main session, to the breakout presentations, and the discussions among the contractor displays, the range of missions, concerns, and future needs that were addressed spanned the spectrum of conflict.

I was most interested in your views as to how our Corps will meet America's future needs in Stability and Support Operations. Topics such as combatting terrorism, counter-proliferation, arms control, and consequence management are becoming as familiar to the Chemical Corps of today as binary, herbicide, Hush flares, and the FLASH were to our predecessors.

The Chemical Corps is ending the 20th Century well positioned for the next. We have viable programs in all our domains of doctrine, training, leader development, organization, and material, all for our most precious asset—our soldiers. The preparation of that soldier for future missions is our most important responsibility today.

While our focus must be on preparing that soldier to visualize, protect, and restore in support of the warfighter, more common missions will be our role in peacekeeping and peace enforcement, CB hazard control, Release Other Than Attack (ROTA) and WMD avoidance, analysis, confidence rebuilding, and environmental protection.

None of these missions will be in a stand-alone mode for the Army. Not only will joint operations be the norm, but interagency operations with partners like the FBI, OSIA, and ACADA will become more prevalent.

Therefore, let me challenge each and every one of you to prepare yourself and your organization not just for tomorrow, but the day after. Use our worldwide web site to keep actively involved. Review and comment on what we send you. Be alert for opportunities to provide a Chemical Corps perspective. After all, in the latest draft of FM 100-5, how many recognized Integrated Warfare as the capstone of our future doctrine?

Charge on, Dragon Soldiers!

NBC Readiness After the Chemical Weapons Convention

by MG Ralph G. Wooten

April 24, 1997 marked the conclusion of our national debate over the Chemical Weapons Convention (CWC), when the US Senate voted 74 to 26 in favor of ratification with the deposit of the instruments of ratification. Upon the deposit of the instruments of ratification with the United Nations, we joined 74 other sovereign nations, and the CWC entered into force on April 29th. I feel confident that many other nations will follow America's lead and that we have passed a major milepost in our efforts to deter the use of chemical weapons worldwide. It was quite appropriate for the United States to resume its leadership as we did in the Conference on Disarmament and make the world a "somewhat" safer place.

I emphasize the world "somewhat," because the critical issue remains—how do we ensure an adequate chemical defense for our nation? This issue is bigger than just our forces overseas, as we must consider CB terrorism, the vulnerabilities of force projection strategies to interdiction at critical ports and airfields, as well as the inevitable advances in technology that create opportunities outside the strict language of the CWC.

With these types of concerns in mind, the Senate established a strong framework for continuing our pursuit of a chemically trained and ready force.

One condition approved with the treaty entitled Enhancements to Robust Chemical and Biological Defense:

"Requires the Secretary of Defense to ensure that US Armed Forces are effectively equipped, organized, trained, and exercised to conduct military missions in CWC and BW environments."

The CWC itself permits members to conduct chemical defense research, produce chemical defense equipment, and continue conducting chemical defense training. The possibility of rogue states, as well as a state party to the convention, using chemical weapons was well understood by the framers of the treaty.

Are there rogue nations who will remain outside the CWC for the foreseeable future—North Korea, Syria, Iraq, and Libya, for example? Very likely! Is it possible in the future a state party to the convention may undertake to develop chemical weapons? Possibly! Have the Russians been studying A-232, which is banned by the spirit of the treaty? It appears so! Is it possible, as press reports have stated, that the Serb-dominated Yugoslav army has stores of chemical weapons that were moved into Serbia after the breakup of Yugoslavia in 1991, and which could endanger our peacekeeping forces? Possibly! Does China possess large

stockpiles of chemical weapons left by the Japanese after WWII? Yes!

Former Secretary of Defense Dick Cheney said, in a letter prepared for the Senate Foreign Relations Committee hearings on the CWC. . . "ratification would lead to a sense of complacency totally unjustified, given the flaws in the treaty." While a false sense of security is insufficient reason not to ratify the treaty, it is a justified warning of potential pitfalls after ratifying it. Now that the treaty is here, we must ensure that our elected officials and our military leaders do not develop a "false sense of security" from this treaty. We owe a first-class defense to the men and women who serve in our national defense. In this vein, the Administration has requested an increase in the NBC defense budget of almost \$225 million over the next five years. We must educate the American public to the fact that the CWC places even more requirements on a robust NBC defense capability.

What must the various components of our government do to ensure our defense? Our R&D community must continue to investigate defense measures to counter any new threat developed anywhere in the world. Our intelligence community must redouble its efforts to identify chemical weapons' R&D locations in other nations, as well

It is the responsibility of commanders at all levels to ensure that their soldiers are chemically trained and ready.

as production, stockpile, and delivery system locations. Our arms control community must be vigilant to utilize the resources provided for in the CWC to bring member states into compliance by exposing illicit activities. Our diplomatic community and executive branch must exercise the moral courage and commitment required to expose any illicit chemical weapons activities of member states, and to bring sanctions and other forms of pressure on non-member states to prevent them from having and using these weapons.

While we need to ensure that commanders at all levels understand that the training requirement for CWC has not diminished, we also need to protect our technology base. As a result of the Convention, some of our industry partners who provide our tech base may find themselves susceptible to declarations and possible inspections visits.

We must continue to assure them that it is still in their best interests to continue to support their DoD (CB Defense) Programs, and that we will assist in protecting their Proprietary (and National Security) information during any possible inspections visits through DoD representation at the Host Teams.

Our leadership must continue to request and commit the budgetary resources necessary to provide our soldiers with the very best chemical defense equipment and training possible to counter the chemical warfare threat from any nation or non-state actor who may oppose us. We must ensure that the necessary R&D is conducted, and these institutions that conduct the R&D, such as CSDC/DW, MEDCOM, and Natick Laboratory, continue to receive adequate resources. Our soldiers must continue the most rigorous, meaningful, and realistic NBC defense training

possible. Our major training centers, such as the BCTP, NTC, and JRTC, must integrate realistic NBC conditions and training opportunities, and the commanders of the training units must include combat task-related NBC defense training in their WET. It is the responsibility of commanders at all levels to ensure that their soldiers are chemically trained and ready. Even if a threat is not presented by a major nation, it could come from terrorist or like groups.

The Chemical Corps must ensure these processes never cease, and must remain a strong conscience of the military. The Corps must continue to stress the need for R&D and for training in NBC defense under realistic NBC conditions. Each chemical soldier, enlisted and officer, must convince us as a commander to program and commit individual and unit NBC defense training. We must make former Secretary Cheney's words a warning, not a prophecy.

The CWC will reduce the number of nations that will develop and stockpile chemical weapons; however, a threat will still be there. We must maintain a high degree of NBC defense preparedness.

Congratulations to the 21st Chemical Company, 82d Airborne Division, Fort Bragg, NC, and 371st Chemical Company, 415th Chemical Brigade, Greenwood, SC, the Sibert Award winners for 1996.

Enhanced Fox NBCRS

—detecting, identifying industrial CBR hazards

By LTC (Ret) Hanns F. Vandrey and LTC (Ret) Donald Cunningham

Over the past year, several articles have appeared describing the employment of the Fox NBCRS at sites potentially contaminated with industrial chemicals. Most notably, two articles in the July 1996 issue of *CML*, *Army Chemical Review* recounted the experiences of Fox crews in Bosnia-Herzegovina in support of the commander's force protection mission. The Fox was used in conjunction with preventive medicine and other theater assets to determine if selected commercial industrial sites posed health risks to in-theater forces. The authors agree that Chemical Corps operations should include the industrial hazards reconnaissance mission. They are also quick to point out that Fox crew members need more mission-oriented training and equipment to safely and effectively conduct these civil-sector reconnaissance missions.

The reconnaissance of industrial sites by US forces is not a new problem. The 1994 Functional Area Analysis noted that doctrine, tactics, techniques, and procedures for the NBCRS' industrial hazards reconnaissance mission had not kept up with this new mission requirement, nor with the fielding of supporting analytical hardware/software. In September 1996, the V Corps Chemical Officer requested assistance in addressing these issues, specifically citing an immediate need for an exportable training package. As a result, the Chemical School initiated a program to correct these shortcomings. We want to provide an update on the measures that

have been taken to address shortfalls in Fox NBCRS reconnaissance activities in and around industrial sites that may be contaminated with commercial chemical, biological, or radiological hazards.

Approach

A five-phased project was initiated under the auspices of the US Army Chemical School's Battle Lab Integration Center. EAI Corporation, a civilian firm headquartered in Abingdon, Maryland, with experience in military and industrial chemical hazards and remediation, was contracted to execute the program.

During Phase I, a front-end analysis was conducted to articulate the mission and identify mission requirements and shortfalls using the DTLOMS (doctrine, training, leaders, organization, materiel, soldiers) model. This phase included several workshops and decision IPRs that broadened the approach and obtained input from a variety of individuals and organizations with interest and responsibility in the area. Participants included representatives from: US Army Chemical School; Army Technical Escort Unit; Army Safety Center; Program Manager, NBC Defense Systems; Army Environmental Center; and Army Center for Health, Promotion, and Preventive Medicine. The Chemical School contingent provided representation from the Directorates of Combat Developments, Chemical Branch Readiness, and Training. The results of the front-end analysis served as

the basis for subsequent phases.

The first workshop established the groundwork for follow-on program activities. It developed a mission statement for Fox NBCRS teams, then looked at organic capabilities of the Fox, determined shortfalls, and finally looked at equipment and training needed to address shortfalls. The approved mission statement for Fox NBCRS units conducting reconnaissance of potentially hazardous industrial sites: *Utilizing mounted and dismounted operations, safely detect, identify, quantify, sample, mark, and report common industrial chemical, biological, and radiological hazards for deployed forces, and survey the extent of any hazard encountered.*

The original intent of the employment of the Fox was to provide a "shirt sleeve" environment (overpressure, filtered air) for Fox crews to conduct reconnaissance of chemical warfare agents. The deployment to areas such as Bosnia required dismounted reconnaissance of chemical, biological, and radiological hazards of an industrial nature. Based on the mission statement, workshop participants developed mission requirements, reviewed current capabilities to meet these requirements, determined shortfalls, and recommended actions to alleviate these shortfalls.

Equipment

Although the M93 Fox NBCRS, with its MM1 mobile mass spectrometer, and "environmental chip," provides some inherent capability to conduct an industrial



SSG Darion Moore models the OSHA Level A training suit during the Concept Evaluation Program.

hazards reconnaissance, commercial off-the-shelf equipment was needed to enhance this capability and to ensure soldier safety in a possible hazardous industrial environment. A market survey was conducted and equipment approved by the Chemical School was procured. Enhancements were provided in the areas of personal protection, detection, identification, sampling, marking, and decontamination.

Fox crews needed enhanced personal protective equipment to conduct dismounted operations. Although the stand-

ard chemical protective ensemble provides excellent protection against highly toxic chemical warfare agents, this protection may not be optimal against some less toxic (but still dangerous) industrial chemical hazards. Consequently, a fully-encapsulated chemical protective suit with a self-contained breathing apparatus, chemical resistant boots, and gloves was provided to enhance the safety of dismounted crew members. This enhancement (the OSHA Level A HAZMAT suit) allows safe dismounted operations to be conducted by a two-person

reconnaissance element for as long as they can be supported by their compressed air bottles. A communications and radio interface capability was added to allow members of the reconnaissance team to communicate with each other.

In addition to enhanced personal protective equipment, the Fox reconnaissance team was provided off-the-shelf detection and identification equipment to complement the MM1's organic capability. This enhancement includes a multi-gas monitor to detect hazardous atmospheric conditions (explosives, oxygen deficiency, for example); a chemical detector kit that uses sorbent tube technology to detect, identify, and quantify hazardous industrial chemical vapors that are not currently detectable by the MM1; and the standard issue AN/PDR-77 radiac set to detect and quantify alpha, beta, and gamma radiation.

The Fox sampling equipment was also expanded to include equipment specifically designed for industrial use. A personal air sampler was added to monitor personal exposures and collect ambient air samples for laboratory analysis after the completion of a reconnaissance mission. The reconnaissance element was also equipped with polypropylene drum thieves to extract liquid samples from

Equipment Description

1. Air Compressor and Accessories
2. SCBA (4)
3. Level A Suit (5)
4. Level A Pressure Test Kit
5. Speaker Interface Box (5)
6. Boots (6)
7. HAZMAT Kit
8. Radio Interface Cables (4)
9. Radios (4)
10. Indoor Weather Station
11. Multi-gas Detection Meter & Acc
12. Sorbent Tubes
13. Personal Air Samp w/Calibration Device
14. M34 Sampling Kit (prototype)
15. Miscellaneous Equipment & Hardware



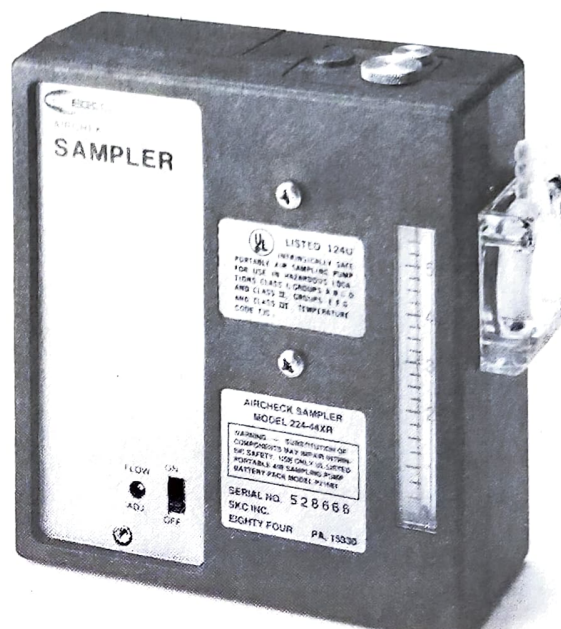
Sensidyne® Deluxe HAZMAT Kit II™

bulk containers, should that be necessary. Finally, the Fox reconnaissance team was provided a prototype of the new M34 sampling kit that facilitates the taking, handling, and transport of liquid, soil, vegetation, biological, and radiological samples for subsequent analysis by the Theater Army Medical Laboratory.

Although the Fox is equipped with standard military NBC marking equipment, it was determined that an enhance-

ment would be prudent to preclude any confusion between wartime chemical agent and industrial hazard markings. Yellow hazard marking tape, labeled "caution-hazardous materials," is used to cordon off contaminated areas; and red hazard marking tape, labeled "danger," marks potentially contaminated sample bags.

Two 2.5-gallon all-purpose hand sprayers provide the enhanced Fox an organic operational decontamination



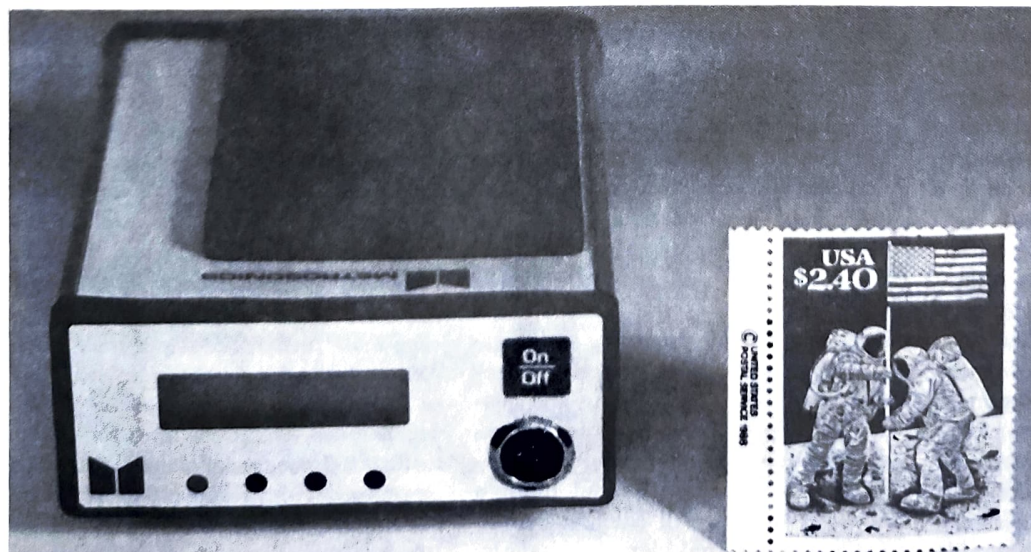
SKC®224-44XR Personal Air Sampler

capability.

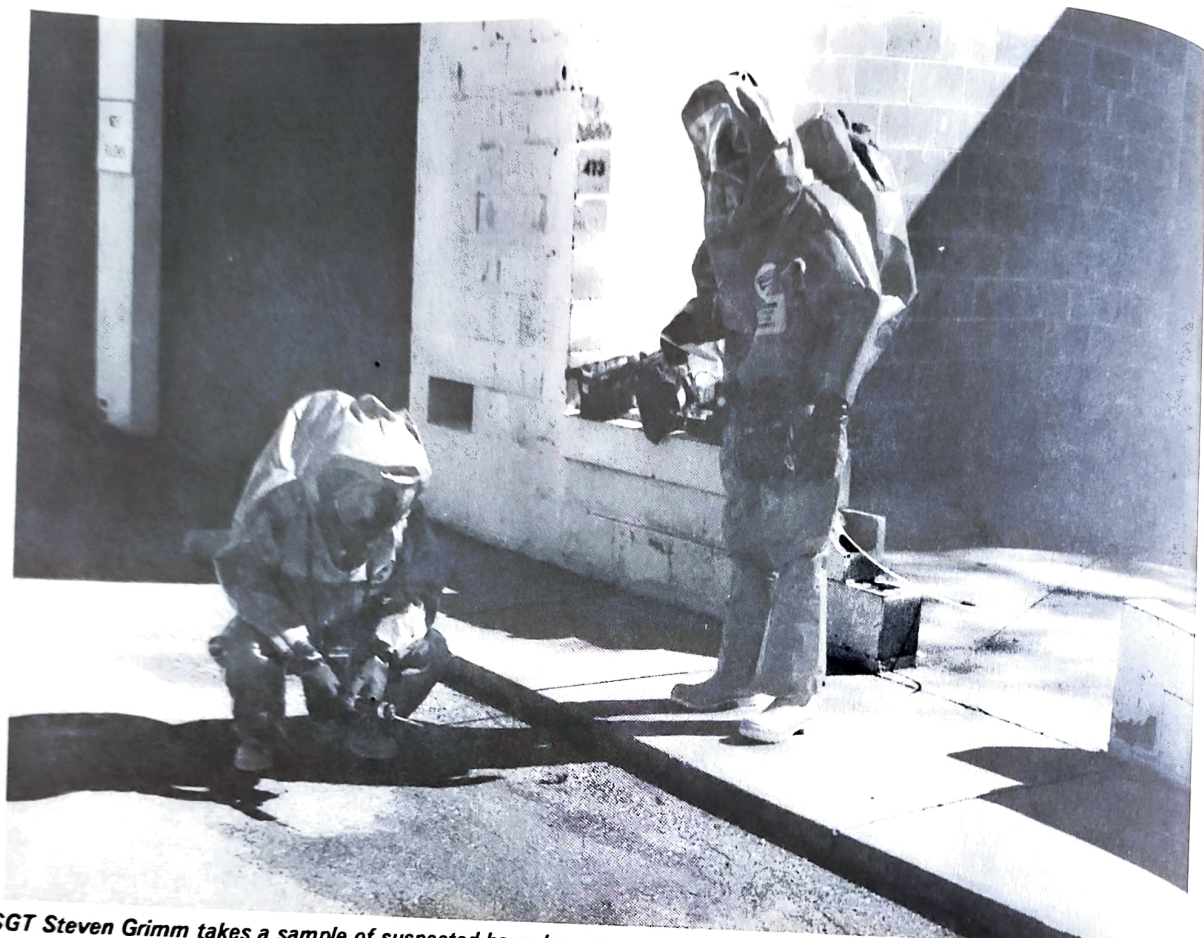
Sufficient equipment was procured to outfit one deployed Fox NBCRS team in the performance of its enhanced industrial hazards reconnaissance mission. In addition, equipment to support a training capability at the Chemical School was provided.

Doctrine

Doctrine addresses both mounted and dismounted activities during the conduct of industrial hazards reconnaissance operations. Mounted operations closely parallel doctrine outlined in FM 3-101-2. One significant exception is that crew members must ensure that the Fox vehicle is not placed in a position where its collective protection system could be compromised by industrial hazardous vapors. As with the protective mask, the vehicle's filter elements provide excellent protection against all known chemical warfare agents, but may not provide optimum protection against some industrial vapor hazards. This means that the



Metrosonics® pm-7400 Four-Gas Monitor™



SGT Steven Grimm takes a sample of suspected hazardous vapor using sorbent tube technology while SSG Darion Moore monitors the operation during the practical exercise portion of Concept Evaluation Program.

crew must often dismount and perform the reconnaissance in OSHA Level A protection.

Dismounted operations doctrine covers levels of protective clothing and its selection through the use of a decision tree, search approach selection criteria, use of hazardous material detectors, and the use of phased operations in order to minimize equipment burden on the dismounted surveyor team.

Fox squad and team task organizations were developed in order to successfully carry out industrial hazard reconnaissance missions. The dismounted reconnaissance element should be organized into a two-person team to ensure personnel safety using the buddy system. Both team members remain together throughout the dismounted reconnaissance operation. A third soldier dismounts directly outside

the enhanced Fox vehicle, fully prepared to come to the aid of the reconnaissance element should the situation warrant such assistance. A fourth soldier, fully trained in industrial reconnaissance operations, remains inside the Fox vehicle during the conduct of reconnaissance activities to operate the MM1 in its industrial chemical detection/identification role. In addition to these four key individuals, the Fox NBCRS squad leader will assign command, control, and support roles to other members of the squad. These roles may include providing assistance in donning and doffing personal protective equipment, establishing and supporting operational decontamination operations, and other support as required to ensure successful mission accomplishment. All soldiers participating in industrial chemical, biologi-

cal, and radiological reconnaissance operations must complete a comprehensive training program prior to their participation in such activities. The training program focuses on the detection, identification, and safety aspects of industrial hazardous materials.

Doctrine, tactics, techniques, and procedures to support the enhanced mission were developed during the third phase of the 5-phase operation. The results of this effort were incorporated into a draft TTP Manual, *Reconnaissance of Industrial Hazards: Chemical, Biological, Radiological—Tactics, Techniques, and Procedures*.

This manual describes the tactics, techniques, and procedures for a team of NBC reconnaissance personnel equipped with the Fox NBCRS, special industrial chemical and radiological hazard detection and identification in-

strumentation, chem/bio sampling gear, and personal protective equipment designed to protect surveyors against toxic industrial chemicals. The manual focuses on the safe conduct of reconnaissance operations in areas where industrial chemical, biological, and/or radiological hazards may be present. It is oriented to the Fox leaders and complements FM 3-101-2, *NBC Reconnaissance Squad/Platoon Operations Tactics, Techniques, and Procedures*.

Training Support Package

During Phase IV, a test training support package based on the TTP manual was developed. The package consisted of 13 individual lessons. The course was designed to be presented in a 5-day period.

This 40-hour exportable training support package, developed and validated as part of the enhanced Fox program, includes a comprehensive instructor's manual that contains all overhead projector transparencies and paper copies, detailed instructor notes, copies of student handouts, and lesson quizzes.

In addition, student study manuals and an equipment checklist manual assist the students in the learning effort. The training focused on hazardous industrial materials, safety, and preparation, operations, and maintenance of mission-peculiar equipment. The 40-hour training support package culminated with an 8-hour field practical exercise. Students were given the opportunity to put into practice concepts taught in the classroom. The practical exercise served two functions: to support and validate the training received, and to provide students the opportunity to use concepts and enhanced equipment in a realistic field environment.

Concept Evaluation Program

The 5-day package was developed, trained, and validated using the TRADOC Concept Evaluation Program approach. The final phase was the conduct of a pilot training course and field test. This phase was designed to:

- Provide evaluation and validation of



David Stark, EAI Corporation principal analyst, presents hands-on training on air compressor operations and maintenance to SGT Steven J. Grimm, CPT Michael P. Oliver, and SSG Darion Moore. The compressor is used to fill self-contained breathing apparatus tanks used in Level A operations.

doctrine presented in the TTP Manual and the TSP;

- Establish any additional requirements for equipment, procedures, and training; and
- Provide a pool of trained personnel to conduct further training using the "train-the-trainers" technique.

The Concept Evaluation Program was conducted over a 5-day period in the Fox's Den and the MOUT site, US Army Chemical School, Fort McClellan, Alabama. Instructors were subject matter experts from EAI Corporation's Abingdon, Maryland, headquarters. Three Fox-qualified soldiers (one officer and two non-commissioned officers) from the Chemical School's NBC Reconnaissance Section participated in the 5-day pilot training program as students. In addition, one observer from the School's Directorate of Training evaluated the program from a training standards perspective.

The Battle Lab Integration Center POC monitored and evaluated the course, as did two Government civilian employees from the Army's Chemical and Biological Defense Command. The comprehensive practical exercise on

the final day of training was observed by representatives of the medical community, local network television stations, and additional staff from the Chemical School. Both the Commandant and Deputy Commandant of the Chemical School observed the exercise and were briefed on the program's results.

Results

With only minor modifications, the tactics, techniques, and procedures developed to enhance Fox NBCRS crew capabilities were validated. Furthermore, the concept for equipping and training Fox NBCRS crew members to safely conduct reconnaissance operations of industrial sites also proved to be sound. Both students and observers felt that the program succeeded in training soldiers on the concepts, tactics, techniques, and procedures to be employed by Fox NBCRS teams in the conduct of industrial hazard reconnaissance operations. Although the present effort focused on actions at the Fox Team level, it was recognized that much work still needed to be accomplished in the development of doctrine for parent chemical units, commanders

... deployed Fox NBCRS crew members are now better able to respond to the commander's requirements without exposing themselves to unnecessary risk.

and staff of non-Chemical Corps organizations, and organizations that are expected to support the Fox Teams in the conduct of their enhanced reconnaissance mission.

Safety considerations still place limitations on the activities of the dismounted reconnaissance element in performing its reconnaissance mission, regardless of the level of PPE selected. For example, it is beyond the scope of the reconnaissance mission to conduct operations in confined spaces that may contain hazardous materials. Also, the detection of explosive atmospheres or an oxygen-deficient atmosphere is sufficient cause to terminate the mission for safety reasons. Finally, dismounted reconnaissance personnel are prohibited from opening sealed containers to obtain samples, because doing so may be counter-productive to the containment/avoidance effort.

Future Actions

The recently concluded enhanced Fox NBCRS program was undertaken as a short-term fix to reduce the risk of Fox crew members in Bosnia being exposed to hazardous industrial materials during reconnaissance operations. If, as expected, the industrial reconnaissance mission is conducted in future deployments, a more permanent

solution should be adopted. This will require DA approval for the enhanced Fox industrial reconnaissance mission, which in turn will require a change in unit mission-essential task lists, modification of Army and Chemical Corps doctrine, adjustments to the programs of instruction of TRADOC courses that address Chemical Corps capabilities, changes to organizational structure (TO&E and CTA 50-900) and investigation into the need to change the grade structure of Fox crew members.

Training programs need to be developed, modified and/or re-validated at three distinct levels: at the Chemical School level, to produce a pool of trained schoolhouse instructors who are able to present a professional course of instruction to field trainers; at the train-the-trainer level, to ensure that field trainers are provided the materials and expertise necessary to impart their knowledge to Fox crew members; and at the user level, to ensure exportable training support packages provide sufficient background and information to meet training expectations.

As part of this effort, off-the-shelf equipment needs to be scrubbed to ensure the procurement of best-value items. In addition, logistical procedures to support resupply, calibration and maintenance of commercially-pro-

cured off-the-shelf equipment must be established. Finally, additional equipment sets to complete a training and sustainment base at the Chemical School should be procured.

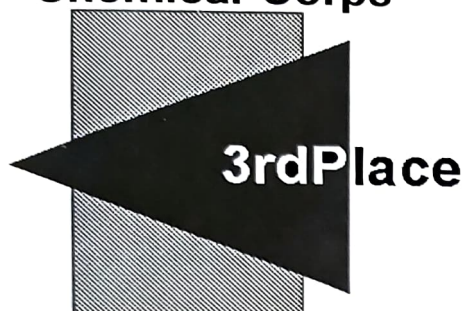
Conclusion

Recent experience has shown that Fox NBCRS teams may be tasked to perform dismounted reconnaissance of sites potentially contaminated with industrial chemical, biological, or radiological hazardous materials during stability and support operations. To address this potentially hazardous situation, the US Army Chemical School has equipped and developed a training program for selected deployed Fox NBCRS crews to enhance their capability to safely and effectively conduct this mission. Although some operational limitations still exist, the deployed Fox NBCRS crew members are now better able to respond to the commander's requirements without exposing themselves to unnecessary risk.

Hanns Vandrey is a Principal Analyst with EAI Corporation. His background includes work with CBDCOM in the Chemical Treaty Compliance arena. Most recently Mr. Vandrey, in conjunction with Mr. Cunningham, coordinated the effort to develop and execute the Fox enhanced capability package described in this article. Mr. Vandrey retired from the Army after serving 23 years as an Air Defense and Foreign Area Officer.

Donald Cunningham is a combat developments specialist in the Directorate of Combat Developments, US Army Chemical School. His background includes development of collective training programs, test and evaluation duties in large field tests, and most recently, experimentation work in the Battle Lab Integration Center of the Chemical School. He is a retired Field Artillery officer and aviator.

Chemical Corps



Writing Contest

The NBC NCO

—the foundation of training

By CPT John D. Shank

Is there a key factor in conducting meaningful, realistic, and effective NBC defense training? Is there something that has not changed over the years as the Army and its doctrine have changed? Is there something that has remained a solid foundation on which to build the Chemical Corps pillars of contamination avoidance, protection, and decontamination? The answer to these questions is an emphatic yes!

To find the answer to these questions, look for a professional who knows and enforces the standards when he is given a task. Look for a professional who coaches, teaches, and mentors a small group of subordinates and goes out of his way for them. Look for a professional who is the primary advocate of his area of expertise. Look for a professional with stripes on his shoulder, a chemical non-commissioned officer.

There is an old saying that goes, "If you give a man a fish, you will feed him for a day. If you teach him how to fish, you feed him for a lifetime." There is a nugget of truth in that little saying that is true in the Army as well. This is the role of the chemical NCO. The non-commissioned officer trains and teaches not only the new soldiers in his unit but the young officers as well.

The chemical NCO plays a critical role by providing stability, continuity, and consistency to a unit over time because he does not change units as frequently as the officers do. The NBC NCO can advise the chemical platoon leader and company commander on

ways to integrate the chemical company into the maneuver unit's mission. The NBC NCO knows how the company was used in the past and can recommend some of the best ways to turn the chemical company into a combat multiplier for that task force commander.

In a combat arms company the NBC NCO is a part of the headquarters section. This puts him in a great position to influence and advise the company commander on ways to integrate the NBC conditions into the METL tasks that the company trains.

As a general rule, commanders don't have enough. They don't have enough time, soldiers, or training areas to conduct the kind of training that they would like to do. The only thing that they seem to have too much of is training distracters and taskings that are not METL related. This is where the company NBC NCO can be invaluable to his unit and directly influence the NBC readiness of his unit.

A unit may not be able to get rid of their non-METL taskings, but they can develop a training program that trains multiple tasks at the same time. The battle that the company NBC NCO fights is to not let NBC training become a stand-alone task but a condition in which to conduct an METL task. This is a battle he can win at company level. Every week in the company training meeting he can ask the different sections how they plan to integrate some NBC tasks with the other tasks that they are training. It may take a few weeks

of encouragement, but the sections will begin to incorporate NBC tasks into their training scenarios.

Most training is conducted at company level or below where an NCO and not an officer is assigned. This is why the NBC NCO has such a critical role. The officer is assigned to battalion level or higher and his focus is on collective training and unit effectiveness and readiness. The company NBC NCO focuses on the individual soldiers and teams in his company. The company has more training opportunities each year to be able to train and sustain their NBC proficiency. The opportunities are more limited at battalion and brigade level.

We have learned a lot since the early days of the Chemical Corps. We have built a training plan based on three pillars: contamination avoidance, protection, and decontamination. The foundation of these pillars is the chemical noncommissioned officers. They are the key factors in conducting meaningful, realistic, and effective NBC defense training—a professional and dedicated group of soldiers who are the front line advocate of the Corps and its mission.

If you disagree with the importance of the chemical NCO Corps, then just stop and look next time you see a company marching down the street. The officer may be in the front of the formation, but it's the noncommissioned officer who makes the company march in step.

CDTF Sets Milestones

By MAJ William Lin

Fort McClellan's unique Chemical Defense Training Facility set two milestones in March 1997 when the 40,000th individual completed toxic agent training and the facility celebrated its 10th anniversary. Open since 1987, the CDTF has served as the culmination point in the training of service members from all branches of the nation's armed forces, from privates to generals. As the only toxic chemical agent training center within the Department of Defense, the CDTF also plays a vital role in improving personnel survivability to federal, state, and civil authorities, including law enforcement officials. In addition, NBC specialists from 29 countries have experienced the physically and mentally demanding training. Truly a world class facility, the CDTF uses state-of-

the-art technology to provide tough, realistic training, while complying with all local, state, and federal regulatory agencies.

Originally constructed as an Army facility, the CDTF quickly grew into a joint and international training center. Army, Navy, Marine Corps, and Air Force NBC specialists now train at the CDTF. The international community also recognizes the value of toxic agent training. NBC specialists from Germany, the Netherlands, and the United Kingdom train in the CDTF. For these specialists, successful completion of the toxic agent training serves as a graduation requirement. Just as airborne students must exit an aircraft, the chemical specialists must face their actual threat.

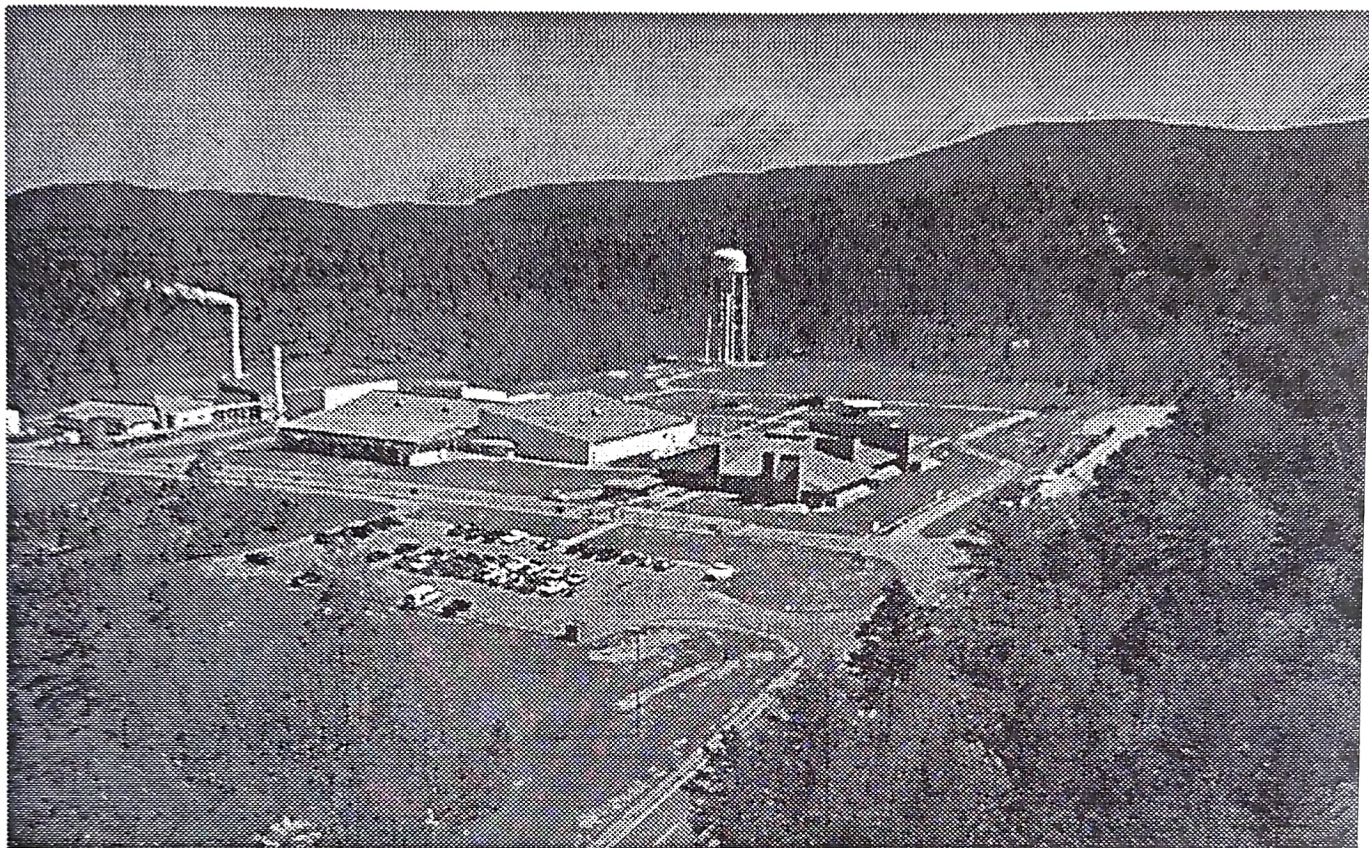
The multi-million-dollar CDTF first opened 2 March 1987. It features seven

negative pressure training bays; a toxic agent preparation laboratory; a technical support section to clean, service, and certify protective equipment; and a solid/liquid waste incinerator. It's the only facility of this kind in the world and is used to train personnel to survive in a chemically contaminated environment. This is accomplished by using toxic chemical agents within the facility's training bays. Each bay is supported by specialized engineering controls and environmental monitoring equipment that ensure toxic chemical agents remain at predetermined concentration levels and that no atmospheric agent release occurs. Another CDTF feature is its on-site nerve agent production and storage capability. Low-scale production (less than 10kg per year) of nerve agent is manufactured in the facility's toxic chemical agent laboratory for eventual use in toxic chemical agent training.

Unlike other US Army chemical activities (such as chemical ammunition depots) where release of any toxic chemical agent is an unacceptable occurrence, the CDTF's design and operation support deliberate, but controlled, release of predetermined quantities of persistent (VX) and non-persistent (GB Sarin) nerve agents. Once a nerve agent is dispersed and a chemically contaminated environment established, students equipped with full chemical protective gear use detection, identification, and



Students at the outside training bay.



Aerial view of Chemical Defense Training Facility. (Photo by CPT Alicia Smith)

decontamination procedures to identify and decontaminate the chemical agents. CDTF cadre produce, neutralize, and destroy all toxic agents on-site. Stringent and redundant environmental controls ensure that no toxic agent is released into the environment and provides for workers' and students' safety.

In the 10 years of operation, the CDTF has never had anyone exposed to agents. This exemplary environmental record was recognized with the Department of the Army Pollution Prevention Award in 1994. The CDTF is also proud of its training and safety records. With over 40,000 soldiers trained, it has never missed a single day of training and completed more than 300,000 manhours without accidents. This remarkable achievement of flawless operation is a tribute to the dedication of military, DA civilians, and particularly the contractor personnel who operate the site.

Training at the CDTF is invaluable, according to experts at the Chemical School, because it provides realistic and challenging training that enhances individual proficiency and confidence. Because military members at every level, in all kinds of units, may one day be subject to chemical attack, they must know how to survive these conditions to be able to fight and win. *Train as you Fight* is a way of life at the CDTF. Over 17,000 CDTF graduates served during *Operation Desert Storm*. These CDTF veterans developed an increased confidence in the performance and credibility of their protective equipment and the procedures that have been designed by the Chemical Corps to keep them alive and greatly enhanced the readiness of the US and coalition forces.

For the past 10 years, the US Army Chemical Defense Training Facility has conducted tough, realistic chemical defense training for attending US and

allied military forces as well as special services governmental agencies. This unique training has provided each soldier, airman, sailor, marine, and civilian with an unparalleled realism and the confidence to perform and protect themselves under NBC conditions.

Besides the ongoing efforts to deter and prohibit the use of chemical and biological weapons, intelligence experts indicate that the prospect of facing an NBC threat in the future is likely. As the scope and nature of the CW threat evolves, ready and trained units challenged with realistic training becomes an imperative. A toxic agent training facility, the CDTF, meets the need for realistic training, keeping America's armed forces trained and ready for the 21st Century.

MAJ Lin is the Chief, Chemical Defense Training Facility at Fort McClellan, Alabama.

Troop Leading Procedures

—developing platoon leaders

By CPT Andrew Herbst

In accordance with FM 77-98-1, *Scout Leader's Handbook*, the troop leading procedures are an eight step process that includes:

- Receive Mission
- Issue Warning Order
- Make a Tentative Plan
- Initiate Movement
- Conduct Reconnaissance
- Complete Plan
- Issue OPORD
- Supervise

Field Manual 7-72, *Light Infantry Battalion*, describes the troop leading procedures in the following way: "The eight steps of the troop leading procedures represent the process by which a leader receives a mission, plans it, and carries it out. Although time may force this to be a rapid process, all steps should be taken even if they are taken in a matter of seconds. The troop leading procedures should be an automatic

way of thinking for leaders." Missions are successful, soldier's lives are protected, and equipment is maintained, when these essential procedures are understood and implemented. The PL routinely uses a checklist (below) to insure he addresses all steps of the TLP.

Receive the Mission

Let's consider a dual-purpose platoon's deception smoke mission. The platoon must place a smoke blanket on a drop zone approximately 800 meters long and 600 meters wide for two hours. First, the company commander receives an Operations Order (OPORD) or Fragmentary Order (FRAGO) from the supported unit. The commander decides which of his platoons can best accomplish the mission. (Soldier and equipment readiness are primary factors in his decision.) The company commander issues the mission to his PL

and requires him or her to return within thirty minutes to backbrief him. The PL backbrief is important to the troop leading process, since it confirms understanding of mission requirements, and addresses the platoon's impact on all the Battle Operating Systems.

Issue the Warning Order

The PL manages his time best by preparing a backwards planning timeline, that includes mission analysis and all the steps of the TLP. The PL, with order in hand, extracts key information, conducts an estimate of the situation, and prepares a warning order (WARNO) for his leaders. The warning order is the platoon's starting point for the mission. WARNO information includes: enemy situation, critical events, changes to task organization, time for earliest movement, time and place where OPORD will be given,

Troop Leading Procedures Matrix

No. and Step	Time	Who	Location	Requirements	Remarks
1. Receive Mission					Conduct estimate of situation
2. Issue Warning Order					Prepare warning order
3. Make Tentative Plan					Backbrief commander
4. Initiate Movement					See map and operations graphics
5. Conduct Recon					Vehicle/equipment preparation and inspection
6. Complete Plan					Bring security
7. Issue OPORD					Smoke overlay Risk assessment
8. Supervise					Sand table SL backbriefs Rehearsals Safety brief
					Security established

orders for reconnaissance, pre-combat inspections and coordination, administrative and logistic preparation and movement instructions.

After issuing the WARNO, the PL returns to the company commander to backbrief him on the mission. During the backbrief, the PL requests clarification on ambiguous mission details. Based upon his initial mission analysis, he may request additional personnel and equipment he feels are necessary for success. The company commander may grant his request, or choose to wait until the PL returns from his leader's recon, or after he has completed his plan. In addition, the commander quizzes the PL on operational aspects and requirements he feels are critical to the mission. The commander dismisses the PL, when he feels confident he fully understands the mission and commander's intent for support.

Make a Tentative Plan

Once dismissed by his commander, the PL uses the map and operational graphics to develop a tentative plan based upon METT-T (mission, enemy, terrain, troops and time) and OCOKA (observation of fires, cover and concealment, obstacles and movement, key terrain, and avenues of approach). He does not over-develop a plan, since it is preliminary and not based on actual site recon.

Initiate Movement

Prior to departing on his leader's recon, the PL discusses movement requirements with his PSG. The PSG will remain in the tactical assembly area (TAA) and initiate movement in accordance with the PL's guidance. Most often, the M101A1s (3/4 ton) trailers are detached from their M1057 HMMWVs, since decon equipment is not required during the smoke mission. Smoke/decon platoons cannot conduct both types of operations (smoke and decontamination) simultaneously and require time to change from one mission to another.

If the company receives a decon mission during the platoon's smoke

mission, another platoon receives the decon mission. There are exceptions to this technique, however, which include: relocation of the company assembly area during the smoke mission, and intense OPTEMPO, which requires the platoon to change mission much sooner than normal. If the platoon brings all its equipment forward during the smoke mission, it remains at the objective rally point (ORP) and is secured by the resupply squad.

Conduct Reconnaissance

The PL leads his SLs on the recon along a (planned) primary route to the ORP and objective. They move in two vehicles and use the traveling overwatch movement technique. This provides greater security during movement than one vehicle would provide. The well-concealed ORP is beyond sight and sound of the objective. This is normally where the resupply squad locates during the mission. The ORP can be easily located at night, when marked with infrared chemilites.

During the recon, the route, ORP and objective should be treated as if they're being observed by the enemy. The PL conceals his vehicles near the objective and leads his soldiers on foot. He travels tactically to the objective along a concealed route. The vehicle

drivers remain behind to secure the vehicles and monitor the radio. The leaders move to an overwatch position, where they can best survey the objective. The PL makes a sketch of the objective and all routes in and out of the area, while the squad leaders become familiar with the terrain.

The leaders wargame courses of action on the objective, which helps the PL to complete his plan. In their position, terrain and weather conditions are the most critical considerations to the wargaming process. A wind direction check is made in at least two locations near the objective. A cigarette best determines wind direction and speed, since it provides a view of smoke movement and dissipates quickly. This makes it difficult for enemy soldiers to observe. (Smoke grenades or generated smoke, on the other hand, may compromise the group's position and alert the enemy to possible future operations in the area.) The PL chooses smoke control points (SCPs) and smoke squad locations. Alternate positions are contingency planned in the event of wind direction changes. The PL positions his primary SCP on high ground and upwind, where he can best observe and control his platoon. To simplify the plan, the PL identifies one smoke squad to remain static and the



All soldiers observe their leaders during the key leader walk-through.



SSG Terry Tumelson backbriefs his portion of the mission to his platoon leader.

other to be mobile or reactionary. Prior to departing, they move mounted along the objective's boundaries, searching for alternate routes and danger areas. The leaders never walk or drive on or across the objective during their recon.

Complete the Plan

They withdraw from the objective area and move along an alternate route to their company tactical assembly area (TAA). While traveling back to the TAA, the PL completes his plan and begins preparing his platoon OPORD. He uses carbon paper to prepare five copies of the OPORD. These are distributed to his PSG and SLs at the OPORD brief. (This will allow his leaders to listen more carefully, instead of writing during the OPORD brief.) He gives his completed sketch to his driver, who is responsible for preparing the platoon's sand table.

The PL prepares a smoke overlay that depicts the way in which he will position himself and smoke systems on the ground to cover the objective. In accordance with FM 3-101-3, *Smoke/Decon (Dual Purpose) Squad/Platoon Operations, Tactics, Techniques, and Procedures*, "Most importantly, the overlay must specify which subordinate smoke units are responsible for each portion of the smoke screen."

Squad leaders prepare smoke unit boundaries. These are checked by the PSG and PL. Chemlites, pickets, or engineer tape are used to mark roads or major terrain features selected for boundaries. This preparation of the objective is essential to safe mobile smoke operations. In addition, the resupply point, smoke pot locations, and any supported unit graphics are represented on the overlay.

Issue OPORD

The PL conducts Step 7 of the TLP, when he issues the OPORD at the sand table. All of the platoon's soldiers are present and sit with their squads on the south side of the table. This arrangement provides an efficient way for the PL to convey his intent to his leaders and their subordinates. From the south side of the sand table, all named representations (routes, smoke squad positions, SCPs, for example) can be read and maps and graphics coincide with the model.

Paragraph I, Situation. The PL strives to conduct a timely OPORD brief. This provides his squad leaders with as much time as possible to complete final preparations before movement. In Paragraph I, he briefs changes to the enemy and friendly situation, attachments and detachments, and weather and terrain.

Paragraph II, Mission. In accordance with FM 3-101-3, Paragraph II is a "clear, concise statement of the task to be accomplished by the smoke unit and its relationship to the mission of the supported unit. This mission statement should answer the questions: Who, What, When, Where, and Why."

Paragraph III, Execution. Mission execution, addressed in Paragraph III, provides the PL's intent, concept of the operation, and coordinating instructions. It is in this paragraph that squad leaders learn their responsibilities and contribution to the overall mission. Their comprehension of the PL's intent and operation instructions will determine whether the unit succeeds or fails. The PL uses a combination of doctrine, unit policy and personal experience to develop the method by which he will best employ his platoon to accomplish the mission. The company or platoon standing operating procedures (SOP) contains many of the coordinating instructions. These instructions are implemented often and are clearly understood by the soldiers. The PL refers to the sand table throughout the OPORD. This technique provides the soldiers with a verbal and visual understanding of the operation.

Paragraph IV, Service & Support. Paragraph IV contains key logistical items of concern. The resupply squad may have additional instructions addressed in this paragraph. All pertinent classes of supplies are identified here.

Paragraph V, Command & Signal. In Paragraph V, the PL announces the position of key leaders and the succession of command. (During the movement and mission, the PL and PSG are never positioned together. This prevents the two top leaders from becoming simultaneous casualties). A successful PL positions himself where he can best command, control, and communicate with his squads throughout the operation. He carefully selects a platoon march order that allows him to command and control movement best. The most experienced squad leader, (first squad [1SQD], for example) leads the convoy. The PL follows behind 1SQD's last smoke

HMMWV. The resupply squad follows behind the PL. The second smoke squad (2SQD) is last, providing rear convoy security. In his position, the PL can better assess situations as they arise along the route and provide direction to his force. For example, if 1SQD drives into a blocked ambush, the PL who follows behind his lead squad is in a position to direct his other squads. He may order his resupply squad to lay suppressive fire on the enemy, while 2SQD flanks and destroys the opposition.

On the other hand, a PL who positions himself in the lead, is more likely to enter an enemy engagement area and become a casualty of direct fire or ambush. The platoon moves to its ORP, where the resupply squad prepares its position for refueling operations. During their preparation, the smoke squads maintain a 360-degree perimeter. The purpose of this procedure is twofold. First, the resupply squad is able to completely concentrate on preparing its position, since the other squads provide security. Otherwise, the squad would be vulnerable to enemy attack if forced to prepare for resupply operations without the security required to protect them. Secondly, all the soldiers now know where they will go for resupply during the mission. This prevents the soldiers from becoming lost and decreases resupply time.

The Signal portion of paragraph five describes effective platoon nets and call signs. In addition, primary and secondary mission start and stop signals are identified in this paragraph.

Once the PL completes the OPORD and answers all questions, he immediately passes the briefing pointer to his 1SQD leader and requires him to back-brief his portion of the OPORD. The 1SQD leader begins at the unit's assembly area, where he describes his position in the movement order. He discusses all critical times and his squad's actions from the mission starting point (SP), until return to the assembly area. On the sand table, he moves his squad's symbol (rock, stick, vehicles) while he briefs. All SLs follow this procedure.



Safety is the most important element during training. (An M1057 smoke HMMWV is air assaulted to a landing zone.)

The PL makes on-the-spot corrections, so the SL is absolutely clear on his squad's responsibilities and actions. Leaders conduct a walk-through in front of the soldiers, following the SL briefs. Each soldier can see their positions relative to other platoon members. This provides operational continuity, since the soldiers will remember the actions and movements of their squad leader throughout the operation. During the walk-through, the PL asks the soldiers how their actions during the mission will fulfill the four requirements of all successful smoke operations. These requirements include: smoke on time, smoke on target, smoke at the desired visibility (blanket, haze, or curtain), and smoke for the desired duration. The PL discusses safety requirements with the platoon, prior to putting the PSG back in charge.

Safety

Prior to each and every mission, safety is discussed. The PL uses a risk assessment aid to prepare a mission risk assessment. The soldiers discuss risk reduction steps to mitigate the inherent danger associated with smoke operations. The PL insists on soldier participation during this important process. When the PL feels his soldiers are

properly prepared for the mission, he turns the platoon back over to the PSG. He reports completion of the OPORD and rehearsal to his commander. He issues a copy of the smoke overlay to the company tactical operations center (TOC) NCOIC, then retires to his sleep area. The PL rests, while the soldiers and their NCOs complete preparations for the mission. He must be tactically sharp, when called upon to make important decisions. (Most PLs do not rest properly before a mission, and their decision-making skills suffer as a result.) NCOs use pre-combat checklists to insure their soldiers and equipment are mission-ready.

Thirty minutes before movement, the PSG directs the SLs to position their vehicles in accordance with the march order and conduct communication checks. He walks the entire line of vehicles and inspects personnel and equipment. Once satisfied, he issues a convoy brief to reiterate key items of concern during the movement. These include: following distance, convoy speed, positioning of air guards, and actions upon ambush, sniper, and roadblock. Five minutes before movement, the PL uses his vehicle radio to give a deployment report to the TOC. (The vehicle radio provides a final communication

check from the platoon to the company.) As a minimum, the PL reports number of personnel, vehicles and sensitive items by type.

The PL reports departure to the TOC as they leave the assembly area. The vehicles move along the primary route as planned. 2SQD, which is the rear element, reports the passing of all checkpoints to the PL. At night, the platoon vehicles keep the proper following distance by maintaining their sight on two blackout markers on the vehicle to their front. (During unlimited visibility conditions, the vehicles maintain a 100-meter interval.) The platoon discussed and rehearsed a variety of convoy contingency plans. It is prepared to react to a myriad of situations. (For example, if the platoon encounters an unblocked ambush, the soldiers know to increase speed, drive through the ambush, and return fire. Finally, the last convoy vehicle drops a smoke grenade or runs one of its smoke generators long enough to screen a pursuing enemy.)

The platoon moves into the ORP, secures the area and positions its resupply vehicles. The soldiers remain dismounted and in a 360-degree perimeter, until the resupply soldiers have completed their preparation and relieve

the smoke squad soldiers at the M60 positions. The M60 positions remain occupied and sighted on primary avenues of approach throughout the operation.

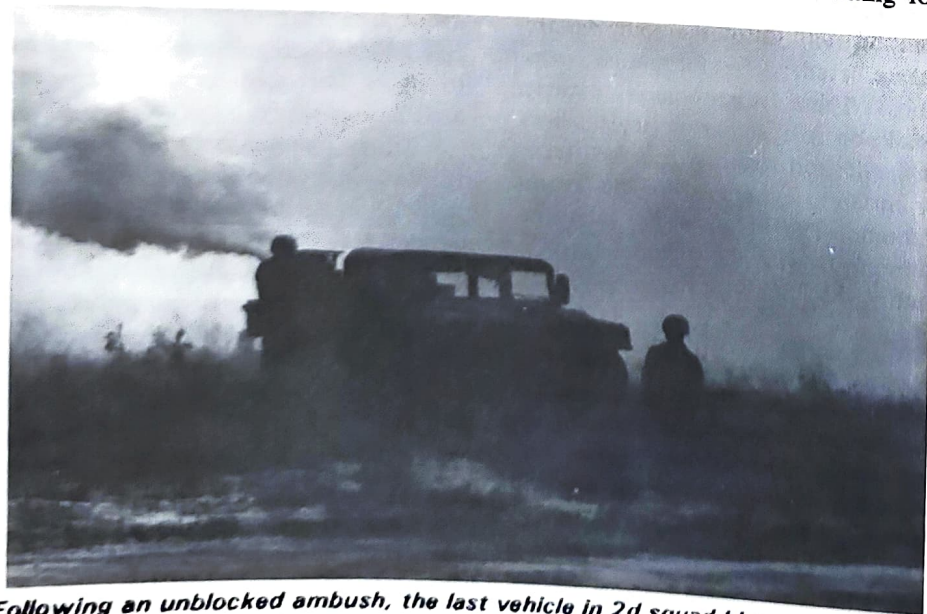
1SQD is sent to the objective to conduct reconnaissance, while the PL and 2SQD remain at the ORP. 1SQD concerns itself primarily with enemy activity and current weather conditions on the objective. It conducts a wind check and reports the findings immediately to the PL. The mission is conducted as planned, if the wind direction has remained the same since the leader's recon. If the wind direction has changed significantly, then the PL will order his squads to flex in accordance with wargamed contingency plans. Either way, 1SQD remains on the objective and moves into hide position in the vicinity of its static smoke position. The PL leads 2SQD to his primary SCP, where they hide the vehicles, dismount, and position crew-served weapons in an overwatch position. They will remain in this area, until the PL deems it necessary to use them. The 2nd SL remains at the PL's side and reacts to his direction.

All vehicles remain in place with engines off. All soldiers observe noise and light discipline while waiting for

the signal. They will not start smoke, however, until the PL gives the order. (If the smoke is to begin at a certain time, then the generator operators will prepare the systems in advance. Otherwise, the vehicles will remain off, until the PL gives the order). Smoke pots, when used, are positioned and vented in advance. (Due to their fire plume, smoke pots are not always used to initiate smoke or to cover initial smoke vehicle movement). Generator smoke initiated from hide positions can conceal smoke vehicle movement and adjustments. Mobile smoke operations are dangerous, and must be conducted carefully. The TC can best assist the driver by positioning himself near the driver's side-view mirror, where he's seen and heard during movement. Furthermore, mobile smoke operations should be conducted under 5 mph.

Supervise

The PL gives the order to start smoke, by issuing a count-down over the radio. (If his radio fails, then he may use a star cluster as a secondary signal.) In this manner, all smoke systems begin simultaneously. This prevents the enemy from identifying the number of vehicles present and provides for a more uniform smoke buildup across the smoke line. The PL patiently observes the smoke go through its three phases: build-up phase, uniform phase, and terminal phase. He is careful not to commit his mobile or reactionary squad (2SQD) too soon, since they provide overwatch security and whose movement from the SCP might be seen by enemy forces currently observing the smoke. If 1SQD was to come under direct fire, 2SQD would respond with M60s suppressive fire until 1SQD could break contact and move to safety. The mobile or reactionary squad may be committed for the following reasons: (1) If the wind direction changes, 2SQD will be ordered to move from the SCP to an alternate smoke position. Once in position, 2SQD becomes the static smoke squad and 1SQD displaces to the resupply point, hide positions or to the



Following an unblocked ambush, the last vehicle in 2d squad blows a smoke screen to blind a pursuing enemy.

PL's SCP and becomes the mobile or reactionary squad. (2) If 1SQD requires resupply, then 2SQD moves to 1SQD's position and conducts a relief in place, so that 1SQD can move to the resupply point. (Three vehicles moving together provide greater security during movement than one or two vehicles.) (3) If 1SQD is unable to cover the objective with the required concentration of smoke, then 2SQD moves to 1SQD's flank and augments the smoke line. If this occurs, then resupply begins 30 minutes into the mission. In this case, two vehicles move to the resupply point together. The fog oil TPU is prepared to dispense fog oil from both sides. MOGAS cans are exchanged, instead of filled, to save time. When smoke vehicles arrive at the resupply point, their personnel relieve the resupply squad M60 gunners so the resupply personnel can return to the TPU and refuel the vehicles. In this way security at the resupply point is always maintained.

When the mission is complete, the PL orders the smoke squads to stop smoke. They move to the pre-designated rally point and quickly reorganize for movement back to the ORP. (The order of march remains the same.)

At the resupply point, the smoke squads provide security, and the resupply soldiers reconfigure the TPUs for movement. The resupply squad falls in behind the PL and the convoy moves back to the assembly area along an alternate route.

This prevents the enemy from ambushing the platoon on its initial (primary) route during redeployment. If the platoon encounters an unblocked ambush on their alternate route, then they will react as rehearsed and move forward two checkpoints ahead. At that location, the PL will get accountability of his force, report to higher headquarters, treat casualties, and continue movement to the assembly area.

Prior to reaching the company perimeter, the PL radios his location to the TOC and asks to have the perimeter guard ready to allow his vehicles to



Soldiers must maintain security on the static smoke line.

enter. The commander may have his reactionary force move to the entrance and set up a machine gun position. This crew will engage any enemy vehicle or personnel following the platoon and attempting to enter the perimeter.

Once inside the security of their perimeter, the PSG insures all vehicles refuel diesel, fog oil, and MOGAS. This begins the preparation for their next mission. Once the vehicles are in place, the soldiers gather around the sand table for an after-action review.

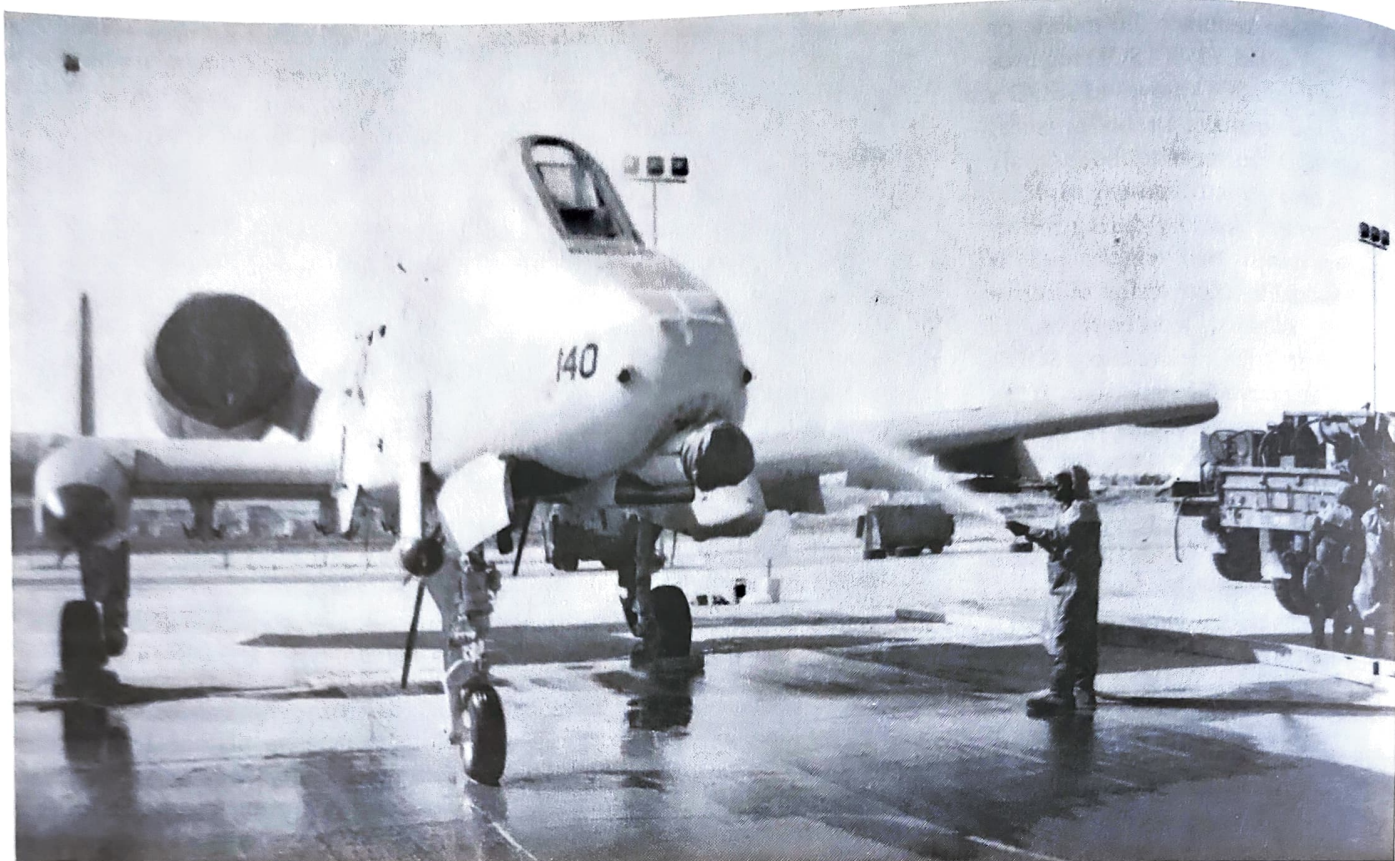
At the sand table, the PL leads the platoon AAR in accordance with TC 25-20, *A Leader's Guide to After-Action Reviews*. He discusses the mission from Step 1 of the troop leading procedures (Receive the Mission) through Step 8 (Supervise). He finishes the after-action review at the point where the platoon re-entered the assembly area. The soldiers discuss mission strengths and weaknesses, and the PL prioritizes areas he wants the platoon to improve. He completes the AAR and turns the platoon over to the PSG who leads recovery and change of mission preparation.

Conclusion

Each PL arrives at the chemical company at a different level of tactical and technical expertise. It is a battalion

and company commander's responsibility to develop platoon leaders into competent and successful leaders. Teaching and using the troop leading procedures go a long way to increase unit readiness. It enables leaders to plan and execute missions in a safe and productive manner. Troop leading procedures are critical to mission planning and command and control. This procedure represents the structure around which all other elements come together and are synthesized into clear, concise orders. The leader who uses troop leading procedures properly prepares for combat.

At the time this article was written, CPT Andrew M. Herbst was assigned as the 82d Airborne Division NBCC Director. CPT Herbst has a BA in biological science from Florida Atlantic University. His source of commission is Officer Candidate School at Fort Benning, Georgia. He is a graduate of chemical officer basic and advanced courses. Previous assignments include Commander, 101st Chemical Company, Fort Bragg; 82d Airborne Division Artillery Chemical Officer, dual-purpose platoon leader, Berlin Brigade; and battalion chemical officer, 5-502 and 6-502 Infantry Battalions.



Station #1. Sprayer removes gross contamination using hot, soapy water.

Detailed Aircraft Decon —92d Chemical Company meets the challenge

*By Spec Paul Coon
50th Public Affairs Detachment*

Ahmed Al Jaber Air Base, Kuwait— Providing decontamination support for Task Force 1st Battalion, 64th Armor and all the subordinate units involved in *Intrinsic Action* is the mission at hand for the members of 1st Platoon, 92d Chemical. And, with 11 operational decons, four thorough decons, and its most recent detailed aircraft decon, the platoon has kept its training schedule jam-packed with good Army training.

"*Intrinsic Action* has been an outstanding learning experience for the soldiers from the decon platoon," said 1LT Donald Patterson, platoon leader,

92d Chemical. "And, being given the opportunity to conduct a detailed aircraft decon on a fixed wing aircraft was by far the highlight of the deployment thus far."

As a first for the 92d Chemical Company, the members of the 1st Platoon were given the opportunity last year to conduct a decontamination on an A-10 from the 20th Tactical Fighter Wing, Shaw Air Base, South Carolina. The decon, normally conducted on the Army's rotary winged aircraft, posed many challenges and obstacles for the chemical platoon.

"As a decon platoon, it is our job to be able to remove contamination on any element involved in an operation," Patterson said. "With the support from the Air Force, the soldiers here were able to test their abilities and successfully conduct this decon to standard."

As the site was set up, the aircraft went through five stages of decontamination. The first station removed the gross contamination from the fighter. At the second station, the soldiers used mops to scrub down the fighter to remove the remainder of the contamination. At the third station, the soldiers monitored the

aircraft to ensure the contamination was removed. The fourth station provided a final rinse for the fighter. And, at the fifth station, the soldiers monitored the aircraft one more time, ensuring the contamination was removed.

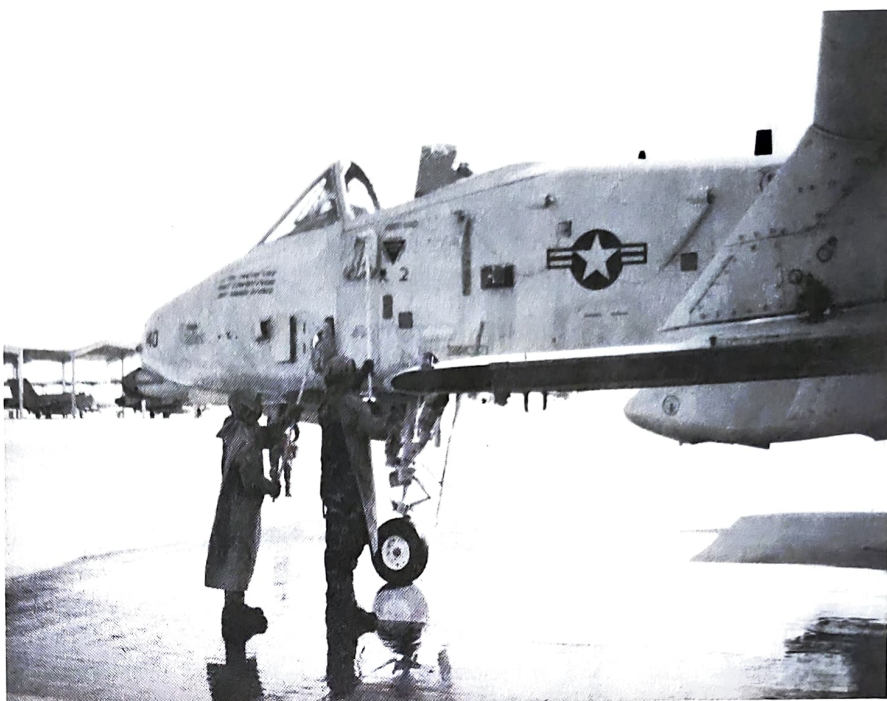
"The decon posed many new challenges for the platoon," Patterson said. "Because of the height of the fighter and the sensitivity of its components, we were forced to take many precautions during the operation."

Unlike the tanks and Bradleys, the platoon is used to working with, the shell of the A-10 houses many intricate components necessary for flight. Radar systems, computers, and other components of the aircraft forced the platoon to decrease the angle as well as limit the pressure of the wash. Regardless, the end result was a success for the soldiers involved. And the platoon was able to provide the Air Force with an example of what measures they are capable of doing to protect their pilots in a real-world situation.

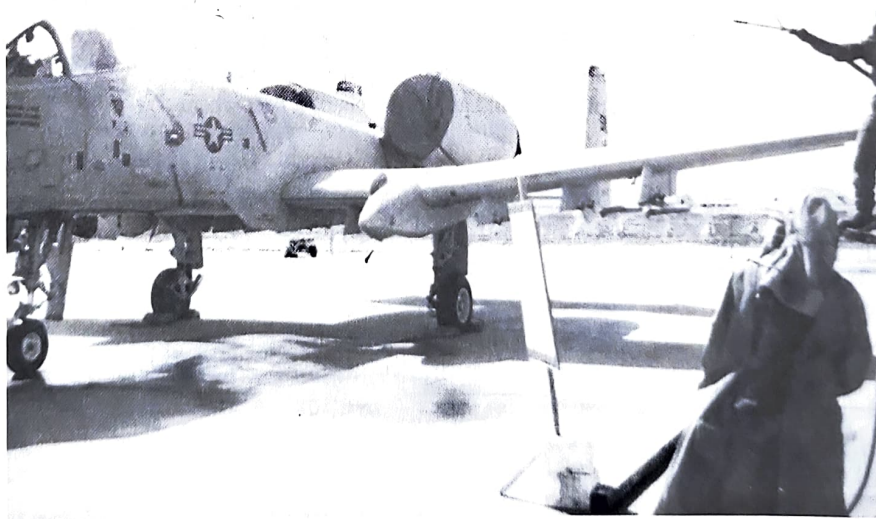
"The platoon's noncommissioned officers provided a great deal of knowledge on the operation," Patterson said. "Because of their expertise and lead-by-example attitude, they made every part of this rotation worthwhile."

As the platoon looks toward their extended forecast of training, Patterson explained that they will look to validate every aspect of the training they have done so far. "This deployment has given our platoon the chance to use real-world resources and techniques unmatched at Fort Stewart, Georgia," Patterson said. "The soldiers deserve much praise and a gratitude of thanks for the job they have done."

We have included the names of the platoon members: 1LT Patterson, SFC



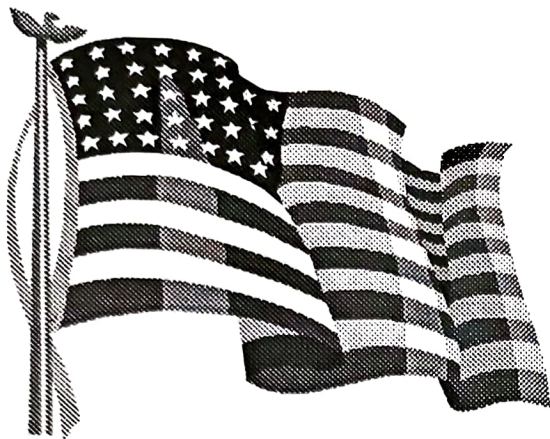
Above, Station 2. Two applicators (using long-handled mops with hot, soapy water) help remove gross liquid contamination. Because of the avionics equipment on the A-1, no DS2 was used. Below, Station 4. Sprayers rinse the aircraft using ordinary water.



Christopher, SSG Haynes, SSG Gay, SGT Saucke, SGT McIntosh, SGT Stokes, SPC Moynier, SPC Hillman, PFC Therrien, PFC Francis, PFC

Aponte, PFC Wagner, PFC Marshall, PFC Bagan, PFC Hobdy, PFC Shipman, PFC Escobedo, PFC Giles, PFC Johnson, PFC Nye, PV2 Cooper.

The Total Force



Reserve Component (RC) institutional chemical training took a stride forward with the activation of the seven Total Army School System (TASS) Chemical Battalions. These units replaced the old US Army Reserve Forces Schools. The TASS battalions are charged with the responsibility for all individual chemical training that occurs within their geographical region of responsibility.

Each battalion typically conducts classes at 10 to 20 inactive duty for training (IDT) sites in their region. This IDT training is normally accomplished in a classroom environment. The more technical, hands-on training is conducted during the two-week annual training (AT), which occurs at a military installation. The importance of this training cannot be underestimated, with two-thirds of the Chemical Soldiers assigned to the RC.

The goal of the TASS program is to standardize the scope and quality of RC chemical training so that it is equivalent to Active Component (AC) resident training. Eventually, AC soldiers could attend RC classes, near where

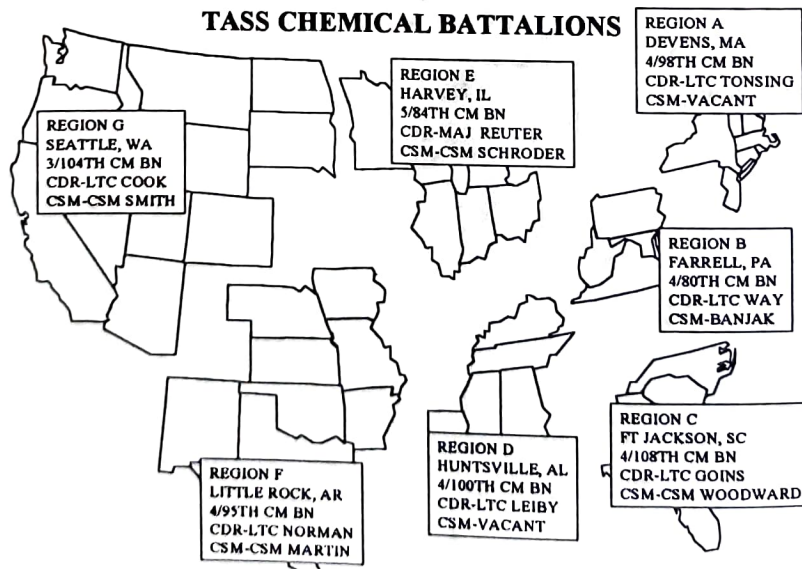
they are stationed, and receive the same training and diploma they would receive for attending the course at the US Army Chemical School (USACMLS).

The TASS battalions and the classes they conduct, both at IDT and AT locations, are evaluated and will be accredited by the AC chemical personnel. The accreditation process occurs every three years to ensure the quality of training remains at a high level; and is in accordance with Army and TRADOC regulations, as well as USACMLS programs and instruction.

Contact Me

Please feel to contact me if I can be of assistance, welcome your thoughts and suggestions. My address is: CDR Jerry M. Elder, Chief, Reserve Component, Training Management Division, Directorate of Training, US Army Chemical School. I can also be reached at DSN 865-5005 (Commercial) (205) 848-5005. My e-mail address is: elderj@mcclellan-cmls.army.mil

TASS CHEMICAL BATTALIONS





Gordon F. Rhea, *The Battle of the Wilderness, May 5-6, 1864* (Baton Rouge, La: Louisiana State University Press, 1993).

The Battle of the Wilderness, May 5-6, 1864, is often found in military history books, but in such books the story is often told that this battle was nothing more than two large forces attacking and retreating through dense thickets and in impossible terrain. As far as it goes, that's true, but this battle has many lessons learned for commanders today.

The Battle of the Wilderness is a well-written and superbly researched book on the two-day battle of 5 and 6 of May 1864. During the battle, there were times when both sides could have won it all, but were not able to make that last effort. Sometimes this effort was through ignorance of the importance of a particular piece of terrain—for example, the Chewning Farm that the Federals initially occupied, but gave up even though the division commander on the farm realized how good the terrain was and was most reluctant to give it up.

The description of the fighting is excellent, although it lacks the lyrical qualities of Bruce Catton describing the same battles in *A Stillness at Appomattox*. The chaos of battle is amply described in the text, and how and why decisions were made in the heat of combat easily understood in context.

The characters of the principals are well developed. The best part of the book is at the end when the author sums up the campaign. Both Robert E. Lee and Ulysses S. Grant are taken to task for missed opportunities, and each assumes a distinctly human form rather than the "military immortals" both

have become. The person who seems to come out behind nearly everyone else is George G. Meade. Much was expected of him, and little realized. The author contends that Grant began to realize during the fighting that Meade just wasn't up to the level needed to maneuver a large army, and he (Grant) began to take a larger role in the direction of the Army. But Grant, himself, was responsible for some of the problems because he insisted on directing Ambrose E. Burnside's Ninth Corps when it rightly should have been under Meade directly. Coordination between the two was Grant's and not Meade's responsibility.

The subordinate generals like G. K. Warren, John Sedgewick, Winfield S. Hancock, Richard S. Ewell, Ambrose Powell Hill, and James Longstreet all performed lower than expectation. Of course, the author concedes that hindsight is better than foresight, but he makes solid cases for the transgressions and lack of capable direction of several of those subordinate commanders named. One of the little vignettes is of Major General G. K. Warren on the night of 5 May engaging in a little less-than-honest behavior by "fixing" the casualty returns of his corps to his (Warren's) betterment.

The maps are fairly well detailed—not as good as Peter Cozzan's *This Terrible Sound*, but good enough to grasp the essentials of the battle. The pictures that accompany the text (taken just after the war) show in detail some of the most important places of the fight.

Geoffrey Perrett, *Old Soldiers Never Die: The Life of Douglas MacArthur*.

To date, there have been at least four major biographies of General MacArthur, including his own *Reminiscences*. They vary in quality from the plainly slavish Frazier Hunt's *The Untold Story of Douglas MacArthur* to William Manchester's *American Caesar*.

Old Soldiers Never Die lies somewhere in between. The author plainly likes MacArthur as an individual and respects his accomplishments. Also, the author makes the reader aware of the General's major flaws. Douglas MacArthur was a complex man: part genius, part stubborn, part petty, and part arrogant. The book takes the reader through MacArthur's upbringing in a very military family and his early days in the Army.

Tradition, they say, is important to any organization, and it is especially important to the U.S. Army. This played a very important part in MacArthur's life, and the author more than any other, links MacArthur, the son, to his nearly equally famous father, Arthur. The link lasted through MacArthur's long and active life.

We, as a nation, seem to hold our heroes up to a high standard. We forget that heroes are, after all, human beings, and as such are entitled to the full measure of foibles humans fall heir to. MacArthur was a supreme egotist and an enormously arrogant man, but that did not and should not detract from his brilliant work as a strategist and commander. His work in the rebuilding of Japan would be enough for any one man, but throughout the war, MacArthur was more right than wrong about strategy. That MacArthur had human traits in full measure should add and not detract from his legacy.

Did MacArthur, as a commander and strategist, make *all* the right decisions? No, the author points out with a generally even hand. What we must learn from MacArthur is that commanders must appoint a strong staff that will enable the General to make decisions that result in as few mistakes as possible. Often the General was ill-served by his staff,

especially so during the Korean war. The author correctly points out that this was partially MacArthur's own fault. He viewed his staff much as a feudal lord does---long-serving, and more like a family than his staff. The general did not have members of his staff who told him what they thought he should hear rather than what he wanted to hear.

One of the more interesting parts of the book is when the author goes into some of the myths and other stories that had grown up around MacArthur and his staff. The one I found most interesting was the story of Lieutenant General Richard K. Sutherland and a particular Australian lady who was a close friend. This story has been told in several different ways, but the author bothered to look into the full particulars and wrote what he had learned.

The author also spent a great deal of time on one of the most controversial aspects of MacArthur's life during World War II: the hours directly after he had been informed Pearl Harbor had been bombed and the Japanese attack on the Philippine Airfields. Because of the research that the author did for his previous book on the history of the Air Force during World War II, he goes into some detail about the attack and seems to place much of the blame on Major General Bereton, although he still finds MacArthur had some culpability for it. He shows that the Bereton Diaries, which were published after the war, are not accurate about this incident.

All in all, this is a book well worth the time and effort of the professional soldier to read and learn from. How MacArthur comported himself as a soldier is worth studying and, in many ways, emulating. I am one who believes that the United States was fortunate to have had Douglas MacArthur in positions of responsibility and he carried that weight. We would do well as a nation to have similar commanders in the future. *Old Soldiers Never Die* is an excellent addition to any professional bookshelf. Read it!

These book reviews were written by USACMLS Command Historian, Dr. Burton Wright III.

Chemical Corps



Writing Contest

Joint NBC Defense

—the challenge of training

By LTC Robert Neumann

NBC defense is a joint issue and requires joint force NBC training. Exercises that deploy joint forces can train in NBC defense and make information flow and protective measures a seamless process that flows across service lines. Joint force exercises need demanding NBC exercises and an extensive after-action assessment process.

—COL Richard A. Jackson
NBC Defense in the 21st Century

One of the goals of the 21st Century Chemical Corps is a trained and ready force that is "trained through joint, multinational, and interagency exercises." This can be achieved through the introduction of realistic NBC scenarios into joint exercises. All future operations will be joint, and we must "train with the team that it will fight with." We must practice NBC defense operations during joint exercises to refine and improve joint NBC defense doctrine and procedures.

Traditionally, training has been a service responsibility. However, the Goldwaters-Nichols Act vested the Chairman of the Joint Chiefs of Staff and the combatant Commanders-in-Chiefs (CINCs) with the obligation to conduct joint training consistent with their assigned missions. This includes the execution of joint NBC defense operations.

The strategic environment today is vastly different from that of the late 1980s. The need to prepare for and operate under NBC conditions was clear when we faced the forces of the Warsaw Pact arrayed along the inter-German border. The Soviet Union had a massive

stockpile of NBC weapons, and everyone was sure that they would employ those weapons during an attack on NATO. While never sufficient in the minds of chemical officers at all echelons, units did conduct NBC defense training to prepare for this threat. Then the Soviet Union collapsed, the Warsaw Pact dissolved, and the threat of massive NBC warfare seemed to disappear. However, the threat of chemical/biological warfare suddenly reappeared in the form of the Iraqi Army. We know from recent history that Iraq not only possessed chemical weapons, but had actually used them in combat. US forces deploying to *Operation Desert Shield* conducted NBC defense training at all levels to prepare themselves for this threat. It could be said that one of the reasons that the Iraqi leadership chose not to use chemical weapons was the state of readiness of US forces.

Now five years after the Gulf War, a recent report found that NBC defense training is not being conducted, especially at the joint level. This is a critical observation since all future operations will be joint. I will examine how joint training is developed and look at how chemical/biological are integrated. And, finally, I will look at how the joint force commander can conduct meaningful, realistic, and effective NBC defense training.

Emphasis Remains Insufficient

In a report to Congress, the Government Accounting Office concluded that joint exercises include little chemical or

biological training. In an analysis of four geographical combatant commands (Pacific, Central, Atlantic, and Europe) it was determined they conducted some 216 exercises in 1995. Only 10 percent of the combatant CINC-directed exercises contained joint chemical or biological tasks. Two main reasons were given for the limited integration of chemical/biological defense into joint exercises. First, chemical/biological warfare was assigned a lower priority than other threats, and, second, it was felt that this type of training was a service responsibility.

The 1996 version of the National Security Strategy calls "weapons of mass destruction—nuclear, biological and chemical—along with their associated delivery systems, a major threat to our security and that of our allies and other friendly nations." The Secretary of Defense has stated that "today a new threat is rising from the global spread of nuclear, biological, and chemical weapons." It is clear that senior leadership of the US military feel that the threat posed by NBC weapons is significant. To support this fact, the Chairman of the Joint Chiefs of Staff identified NBC defense as one of the issues for improving long-term interoperability and enhancing jointness in his Joint Training Master Plan for 1998.

While the services have the mission to provide trained and ready forces, the joint force commander must execute NBC defense operations to protect his force. To ensure that joint forces can execute NBC defense operations, the

joint force commander must practice and exercise NBC defense during appropriate exercises. Without training, deficiencies in organizations, doctrine, equipment, and leaders cannot be identified nor corrected. Procedures for joint NBC defense will not be developed prior to their need.

How Joint Training is Formulated

Joint training is a continuous process that uses the command's Joint Mission Essential Task List (JMETL), the command's training status, and the Joint Training Master Plan to develop a joint training plan. The command's training plan is then executed and the training is evaluated. From the evaluation, the combatant commander-in-chief then updates the command's training status and the cycle begins again.

Joint Mission Essential Task List

The JMETL is the translation of the CINC's required military capabilities and plans into training guidance. The JMETL is the result of a process that analyzes the assigned missions, plans/orders, joint doctrine, and the Universal Joint Task List. The JMETL is the translation of the CINC's required military capabilities and plans into training guidance.

Review of Plans/Orders. Each combatant command reviews current operation plans, concept plans, functional plans, and operations orders. An analysis of plans in US European Command shows that a majority of the plans identify that the operation could be conducted under NBC conditions. While the threat of enemy NBC attacks has diminished in the US European Command theater, with the breakup of the Soviet Union, there are four countries with weapons of mass destruction programs in the area of responsibility/area of interest. These countries are Libya, Syria, Iraq, and Iran. Another threat facing US forces is hazards from nuclear and chemical facilities. These facilities include nuclear power plants and commercial chemical plants. NATO has even coined a term for these

non-military NBC hazards—"releases other than attack (ROTA)." ROTA is a concern during both combat operations and operations other than war. Another NBC hazard in the area of operations occurs when NBC agents are released when enemy weapons of mass destruction facilities are attacked.

part of the "mobility and survivability" mission area. However, within mobility and survivability mission areas, NBC defense is not as clearly articulated as in strategic theater and operational levels. NBC defense functions are contained in two tasks: Protect Individuals and System (TA 6.3.1.1) and

Threat/conditions	Plans
Threat of enemy NBC attack	6
ROTA	10
Release of NBC agents	2
None	3

Note: 14 total plans. Some plans have multiple threat/conditions

While all attempts are made to select the method of attack that minimizes release of NBC agents, no method will guarantee that agents will not escape from the destroyed facility.

Universal Joint Task List. The Universal Joint Task List is a joint staff developed list of tasks based on joint doctrine, tactics, techniques, and procedures. NBC defense tasks are located at three levels: strategic theater, operational, and tactical levels (table below). At the strategic theater and operational levels, NBC defense is a component of the "provide protection" mission area. At the tactical level, NBC defense is

Remove Battlespace Hazards (TA 6.3.1.1).

Joint Training Master Plan

Joint Training Master Plan provides guidance from the Chairman of the Joint Chiefs of Staff to the combatant commands and services on the planning and execution of joint training. In the latest version of the Joint Training Master Plan, NBC defense (Universal Joint Task List Task ST 6.2.7, Establish NBC Protection in Theater) is listed as one of the CJCS commended training issues for ongoing action. Commended training issues are special interest items that are included in the Joint Training

Level	Task
Strategic Theater	ST 6.2.7 Establish NBC Protection in Theater. To defend against, detect, monitor, and reduce NBC threats. This includes warning and reporting of NBC threats. This task involves both threat reduction and implementation of readiness measures (JP 3-11). Note: For identification of likely friendly targets of enemy NBC attack, see ST 2.3.2, Analyze Theater Area of Interest and ST 2.3.6, Identify Operational Vulnerabilities. See also ST 8.4.4, Counter Weapon and Technology Proliferation.
Operational	OP 6.2.7 Establish NBC Protection in Theater of Operations/JOA. To ensure the detection, warning, and reporting of and protection against NBC threats in the operational area. (JP 3-11)
Theater	TA 6.3.1.1, Protect Individuals and System. No specific NBC defense tasks listed specifically, but JP 3-11 is listed. TA 6.3.1.1, Remove Battlespace Hazards. To eliminate the presence of hazards to equipment and personnel. This task includes decontamination and EOD support. (.....JP 3-11,.....)

Master Plan to ensure visibility to the combatant commands in developing their joint training plans.

Challenges To Integrating NBC Defense Into Training Plans

Limited Staffing. Each geographical combatant command has a chemical staff officer. The majority of CINC chemical officers are located in the Plans and Policy Directorate (J5). Training plans are developed in the Operations Directorate (J3). Good coordination and working relationships are essential for the chemical staff officer to become involved in the development of the command's training plan. Additionally, staffing of NBC defense personnel in the service components varies widely. The bottom line is that there are not many NBC defense specialists available to review and champion the inclusion of NBC defense into training plans in joint headquarters. Component NBC defense personnel must champion for the inclusion of NBC scenarios into joint training exercises. In most cases, the service components plan and conduct the majority of joint exercises.

NBC Threat Analysis. Each of the combatant command's plans and orders must clearly identify the NBC threat to include an assessment of possible ROTA hazards. Each plan must contain a concept of NBC defense (Appendix 2, NBC Defense, Riot Control Agents, and Herbicides) to Annex C (Operations). Contained within this appendix must be a detailed threat assessment. The Table above contains an example of the wide variety of possible NBC threat that could be found in a major regional conflict or limited regional conflict.

While the table demonstrates the possible threats in major regional conflict or limited regional conflict, military operations other than war are not without NBC threat. One of the potential humanitarian support operations in the US European Command area of responsibility is a nuclear power plant

Type of Threat	Level of Threat	Remarks
Threat of enemy NBC attack	High	Toxic agents (nerve & blister) Riot control agents
ROTA	Medium	Improper disposal of hazardous materials Commercial chemical industrial complexes Nuclear power plant
Release of NBC agents	Low	Reported CW capability No identified storage facilities

accident in Lithuania. This potential operation is the subject of a major joint exercise in 1997—*Agile Lion*. *Agile Lion* will involve a joint task force that deploys to provide humanitarian support after a major accident at the Ignalina nuclear power plant.

Competing Requirements

A number of competing requirements will affect the type and scope of joint training conducted within a geographical combatant command. The major regional conflict/limited regional conflict mission always contains the most dangerous NBC threat; however, the major regional conflict/limited regional conflict mission may not be the most likely mission. Within the US European Command area of responsibility, humanitarian/disaster relief and noncombatant evacuation operations are the most frequently conducted missions.

Actual operations will impact on the type and scope of joint training. Planned exercises may be canceled or changed to satisfy new priorities. Exercise *Agile Lion* was scheduled for January 1996, but the units involved deployed to support *Operation Joint Endeavor*.

Political sensitivities also affect the type and amount of NBC tasks integrated into joint training exercises that are also combined. Some countries do not want NBC scenarios placed in joint combined exercises. Others will severely limit the type of NBC play, only integrating chemical and never allowing biological or nuclear. Others will

focus the entire exercise around an NBC scenario. *Exercise Rescuer 96* is an example of this. *Exercise Rescuer 96* is a Partnership for Peace exercise sponsored by the United States and the Republic of Macedonia. The exercise scenario has an earthquake damaging two large chemical storage tanks. Neighboring countries will provide disaster relief assistance that will include NBC defense units from Albania, Romania, and Macedonia.

Conclusion

The readiness to respond to crises and contingencies is achieved by training. If NBC scenarios are not included in training exercises, the joint force will not be ready to respond to NBC incidents. The proliferation of weapons of mass destruction is one of the greatest threats facing the US military today. We must prepare to face this threat and training is key. Commanders at all echelons, to include the CINCs and the service component commanders, must ensure that NBC defense is trained and exercised whenever possible.

While the GAO report did indicate that some NBC defense training is being conducted in joint training exercises, it is clearly not proportional to the threat. To maintain NBC defense readiness, an effective training program of frequent, closely coordinated exercises is required. NBC conditions and situations have never been popular, but a dedicated effort to ensure NBC is integrated into training will pay off if US forces ever have to operate under NBC conditions.

Dragon Warrior

—III Corps exercise

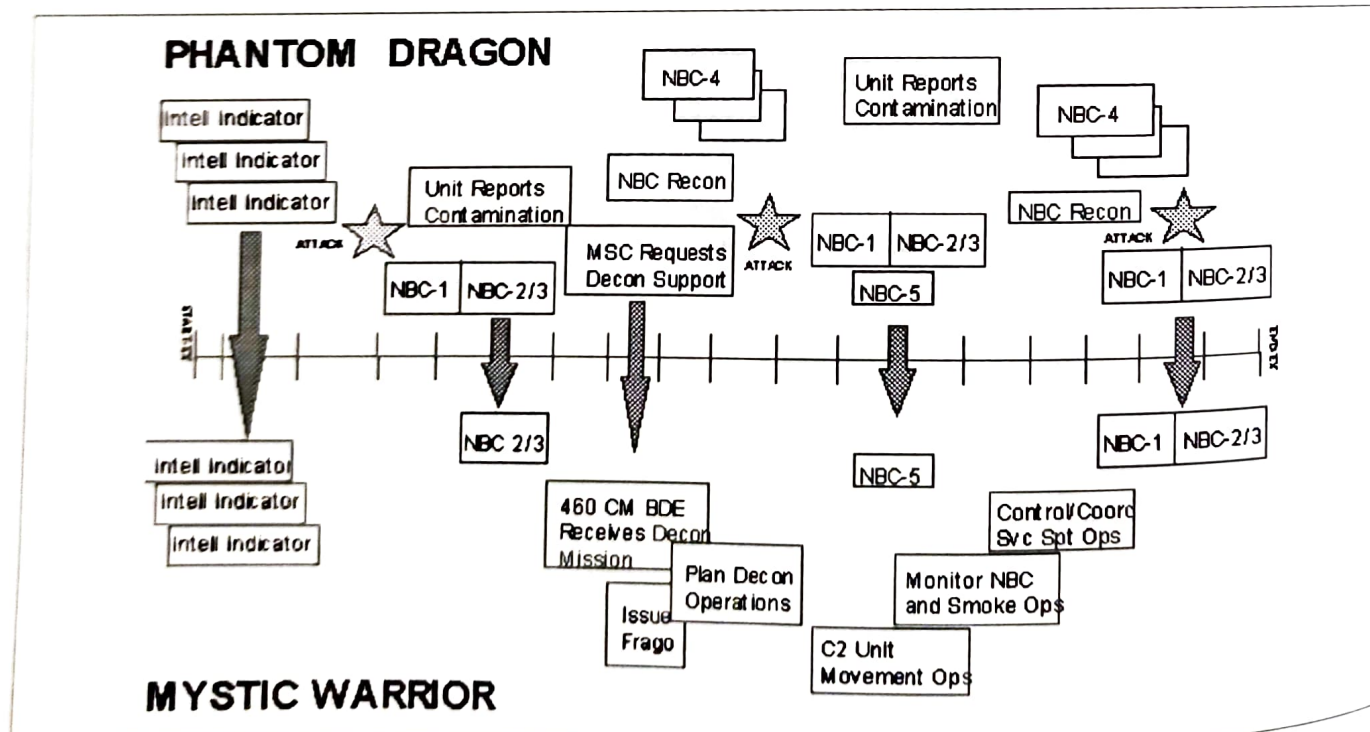
By MSG Donald Ricketts

When COL Cain, III Corps and Fort Hood Chemical Officer, identified November 1996 as the month in which to conduct the next *Phantom Dragon* NBC exercise, he had no idea how big the annual exercise would become. The *Phantom Dragon* was the first chemical exercise conducted as an intensive training environment for separate brigade and division-level chemical staffs since 1994. This exercise allowed chemical staffs to focus their training on specific NBC warfare issues that supported the III Corps Commander's intent for ground maneuver operations.

This not only made the chemical staffs more proficient, it prepared them for their annual Warfighter exercise. When *Phantom Dragon* was over it was obvious that this was the first Warfighter exercise fought exclusively under intense NBC conditions. This series of NBC exercises is critical to the sustainment of NBC skills over the entire warfighting spectrum. From the lead tank to the logistician at the port, everyone must be the best at what they do. Doing its job under intense NBC conditions is what separates a good Army from a world class Army. This mentality is echoed in the Joint Chiefs

of Staff doctrine for operations that states, "It may not be the sheer killing power of these weapons that produces the greatest effect. It is the strategic, operational, psychological, and political impacts of their use that can affect strategic objectives and campaign design."

The III Corps chemical staff held a meeting to discuss the exercise and develop a time line of things to be accomplished. During this meeting the discussion shifted to another annual exercise called *Mystic Warrior* that would occur at about the same time as the *Phantom Dragon IV* exercise. *Mystic*



Separate but parallel.

Warrior is the 460th Chemical Brigade's annual exercise conducted by the 75th Division in Houston, Texas, with assistance from the III Corps chemical staff. The plan developed in this meeting called for combining the *Phantom Dragon IV* and *Mystic Warrior* exercises, adjusting the dates, and calling it *Dragon Warrior 96*. After the time line was completed, III Corps Chemical went to work to reduce the amount of time spent in the field on two separate exercises without reducing the training soldiers needed to stay combat ready. All of this had to be accomplished without spending a large amount of money. The first, and most critical, step was to meet with the 75th Division in Houston, Texas, to discuss combining the two exercises.

During the meeting in Houston between the 75th Division and the III Corps chemical personnel, it was decided that additional money could be saved and a better exercise environment would be possible if we:

- Combine the two exercises as discussed

- Move the command and control piece from Houston, Texas, to Fort Hood, Texas, Battle Simulation Center with a communication link to the 460th Chemical Brigade in Little Rock, Arkansas.

- Develop an acceptable command and control process to facilitate both the exercise of III Corps elements and the evaluation of the 460th Chemical Brigade.

A quick check with the Fort Hood Battle Simulation Center and additional coordination between III Corps and 75th Division soon produced the base from which *Dragon Warrior 96* would be fought.

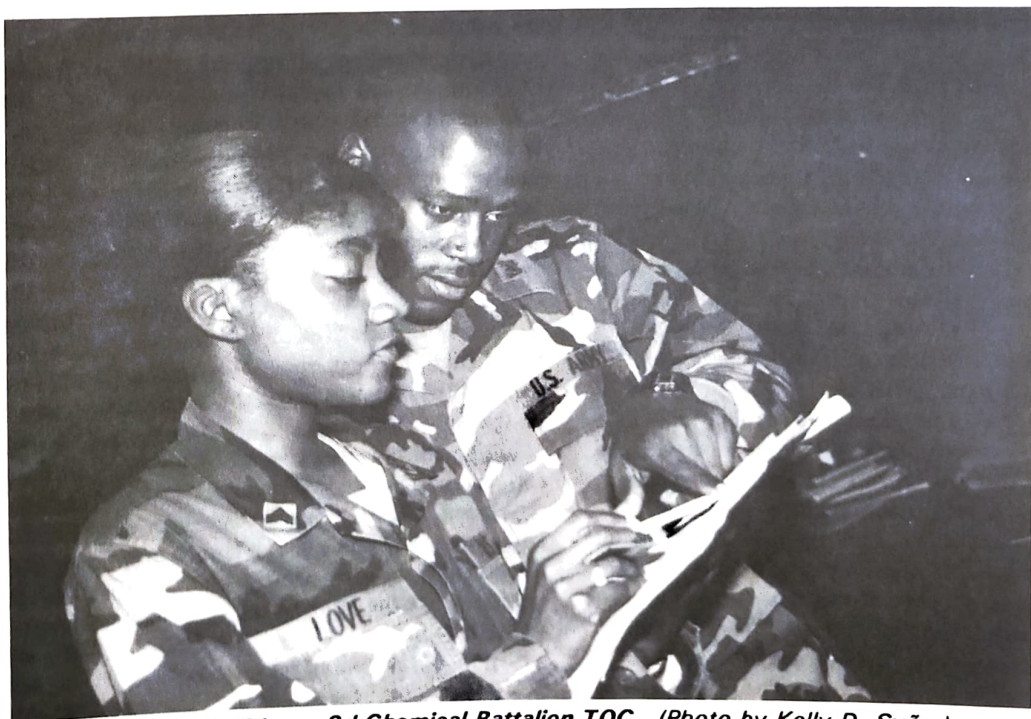
There were several advantages to combining these exercises: increased manning, better command and control, operation/utilization of the

Fort Hood Battle Simulation Center, and the use of the Corps Battle Simulation (CBS) computer. When the meeting with the 75th Division was over, it was agreed this exercise would be a 36-hour, non-stop exercise conducted from 15-17 November 1996. The exercise would be in the Battle Simulation Center on Fort Hood, Texas, with a communication link to the 460th Chemical Brigade in Little Rock, Arkansas. It was agreed that the 75th Division would be the senior control and exercise director for *Dragon Warrior 96*, with III Corps chemical assisting in command and control issues, input for NBC attacks/events, and the operation of the Corps chemical NBCC.

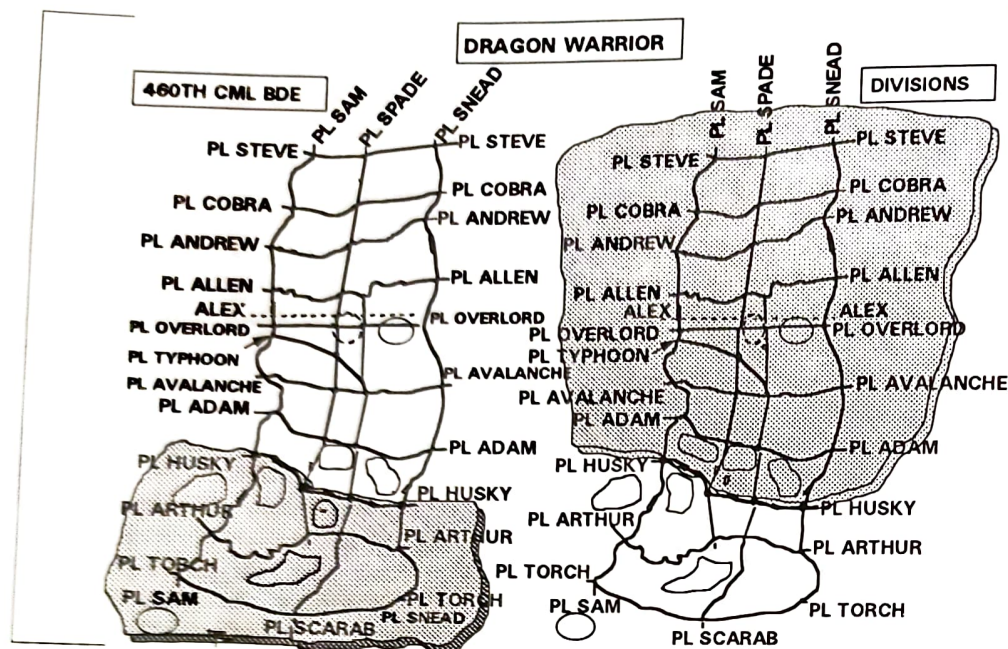
The chart on the previous page shows how command and control as well as information was shared between the two exercises. Starting from the left, intelligence is shared, as it would be in a normal exercise. When the chemical attack occurs, it, too, is shared, as it would be in a normal exercise. If the chemical attack were designed to

exercise the 460th Chemical Brigade, then there would also be follow-on information and requests for assistance. As the 460th Chemical Brigade reacts to the attack and requests for help, there is another chemical attack. This attack occurs up near the Forward Edge of the Battle Area (FEBA). The attack information is shared with the 460th Chemical Brigade but does not require the 460th Chemical Brigade to react to this attack nor are there any follow-on requests for help. This is reflected by the 460th Chemical Brigade receiving only the NBC reports and no follow-on requests for assistance. A meeting of key personnel, called the White Cell, will evaluate the progress of the 460th Chemical Brigade to determine if another chemical attack is needed to further evaluate the 460th Chemical Brigade or to move on to the next event on the synchronization matrix.

The key is in the flexibility to provide an exciting, fast-paced, and challenging environment for both the *Phantom Dragon IV* soldiers and the



WO1 Jones and SGT Love, 2d Chemical Battalion TOC. (Photo by Kelly D. Suñe.)



Mystic Warrior soldiers. This methodology worked very well for the *Dragon Warrior* exercise. One key to keeping soldiers and leaders focused on *Dragon Warrior 96* was to provide training objectives that were attainable and mission focused. The III Corps training objectives for *Dragon Warrior 96* are as simple as they are complex and challenging:

- To build upon experience gained from the III Corps Warfighter.
- Provide 4th Infantry Division the opportunity to work chemical and Force XXI issues in preparation for the upcoming Advanced Warfighter Experiment.
- Integrate active and aligned reserve component Chemical Staffs.
- Validate draft doctrine on employment of the 310th Chemical Company (BIDS).

The theater of operations is a fictitious place called Oneland with the countries of Northland, Southland, Midland, Eastland, and Westland. The scenario is one in which Northland invades Midland. Southland, fearing future aggression, helps Midland push the Northland forces back towards Northland. As a part of the NATO Alliance, III (US) Corps is ordered to Midland to assist in defeating the

Northland forces.

With approvals in place and the Simulation Center scheduled, it was time to get busy putting the Corps, Division, and separate Brigade orders together, writing the exercise TDA and developing the unit data base for the computer simulation. Working side by side, often on weekends, the orders were written using a Western European scenario. Soldiers from the 75th Division worked day and night with soldiers from III Corps Chemical to develop the scenario, coordinate the events, and choreograph the numerous events that would take place in the 36-hour exercise. The area of operations for the two exercises is shown in the figure above. The 460th Chemical Brigade area of operations is the shaded area on the left-hand side and the division area is the shaded area on the right-hand side.

To enhance the exercise scenario, an enemy rogue commander was developed. The rogue commander's name was BG Yubetcha. The rogue commander scenario was established to help simplify the often unreasonable or unpredictable use of NBC weapons. With the destruction of Hieschau, a Northland city, the groundwork was established for a rogue commander. To

further enhance this scenario, COL Yugotit, nephew to BG Yubetcha and Commander of the 12 MRD, was killed while home on a visit, as were several other family members during the destruction of Hieschau. BG Yubetcha, with the help of his cousin and Commander of the 18th Artillery Division COL Wynot, set out on a mission to destroy the Coalition Forces at any cost.

Chemical soldiers came from Fort Bliss, Fort Sill, Fort Carson, and Fort McClellan to represent their units alongside 4th Infantry Division (M), 13th COSCOM, 3d Armored Cavalry Regiment, 31st Air Defense Artillery BDE, Corps Artillery, 89th Military Police Brigade, 13th Finance Brigade, 504th Military Intelligence Brigade, 3d Signal Brigade, and the 2d Chemical Battalion from Fort Hood, Texas. The 310th Biological Integrated Detection System (BIDS) and the 20th Chemical Detachment (BIDS) participated with III Corps for the very first time. The 460th Chemical Brigade participated from Little Rock, Arkansas, via a distributed signal from the Fort Hood Simulation Center. The chemical doctrine and training departments from the Chemical School, the Chemical and Biological Defense Command from Maryland, and the Battle Command Training Program (BCTP) Chemical Officer also participated in *Dragon Warrior*.

With the synchronization matrix in hand, work began on developing the weather package and the NBC attack modules. Det 14, 1st Group/3d Weather Squadron (USAF), stationed on Fort Hood developed the weather for this exercise. Because the exercise was conducted in November, the decision was made to have a realistic weather package for a typical

DRAGON WARRIOR

Chemical Downwind Message 110600 - 111200 Nov 96

Whiskey	100014	40094-1
X-ray	100014	3028-1
Yankee	100014	3038-1

Chemical Downwind Message 111200 - 111800 NOV 96

Whiskey	100014	3048-1
X-ray	100014	3068-1
Yankee	100014	4058-1

Effective Downwind Message 110600 - 111800 Nov 96

ZULU	DDtttt	110600 (L)
ALFA	dddsss	218021
BRAVO	dddsss	226022
CHARLIE	dddsss	016023
DELTA	dddsss	029024
ECHO	dddsss	050023
FOXTROT	dddsss	089019

DRAGON WARRIOR

Exercise Weather 110600Nov96

- Synoptic Situation
 - Low pressure system moving slowly across Poland
 - Variable high clouds with morning fog
 - Light showers possible in morning hours
- Present Weather
 - H = 58°F, L = 42°F, RH = 91%
 - Winds = 8 KMPH from NW, Precip = very light showers
- Forecast
 - Mostly cloudy skies with moderate temperatures and light wind (strong, gusty winds around thunderstorms)
 - Winds from the NW
 - High temperature 59°F, low temperature 45°F
- 48 Hours
 - Mostly cloudy skies with cooler temperatures. Light and variable winds, gusting around 59°F, with a low of 44°F
- 72 Hours
 - Mostly cloudy skies with lowered ceilings. Winds increasing and becoming northerly.
 - Becoming cooler with a high temperature of 55°F and a low of 43°F

November in Germany. The package consisted of four slides per 12-hour period:

These slides were sent out to the units via the Tactical Local Area Network (TACLAN) every 12 hours. Those units that could not receive the slides from the TACLAN could receive them by fax machine.

The NBC attack modules are designed to support the synchronization matrix yet remain flexible enough to shift along the synchronization matrix

time line to match up with the current combat situation. For example, the module may call for a persistent chemical attack to occur at 0600 at a predefined grid. When the time comes to initiate this attack, the current location of friendly and enemy units as well as the Operation Tempo (OPTEMPO) may no longer support a chemical attack. The exercise director can postpone the attack, change the grid, or cancel the attack all together. This linkage assists the flow of

activities, provides a quick look capability for the exercise director, and reduces the "shoot from the hip" mentality of injecting chemical events/attacks.

In preparation for the start of the exercise, the road to war included the chemical attacks that happened prior to the arrival of the Coalition Forces (Start-ex). The chemical strikes that occurred two days prior to start-ex were input into the Corps Battle Simulation computer system as contaminated areas. Any vehicle or soldier crossing these areas became contaminated. There was also a nuclear reactor that was damaged in the pre-start-ex scenario that was releasing low amounts of radiation. This would pose a unique problem for the 3 ACR and their helicopter assets later in the exercise.

Units went to work setting up their work cells in the Battle Simulation Center 14 November 1996 (0800). With excitement and anticipation, units set to the task of posting maps and charts, learning the CBS computer system, and establishing the TACLAN. In addition, each unit developed a plan to work on areas of operation unique to their unit. This plan would provide for training and exercising new operations procedures, validating SOPs, and establishing working relations with adjacent units. All of this was accomplished by coordinating the needs of the unit with the goals of the exercise. After establishing the needs of the unit, the synchronization matrix was adjusted to provide the unit a minimum of exercise distraction while they focused on their individual training.

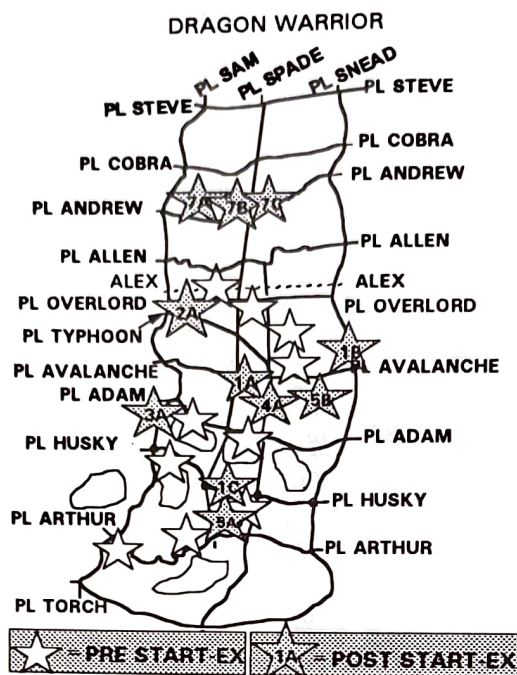
15 November 1996 (0900), in the auditorium of the Battle Simulation Center, the opening speeches and the road to war established the exercise environment for *Dragon Warrior 96*. The 310th Chemical Company (BIDS) gave a very detailed briefing on the Army's new M31 BIDS capabilities:

- Detects and characterizes aerosol clouds for biological content.

COMPOSIT STRIKES

STRIKE	AGENT	DELIVERY
1	P-Nerve	SCUD
2	P-Nerve	SCUD
3	P-Nerve	SCUD
4	P-Blister	SCUD
5	P-Nerve	SCUD
6	P-Blister	SCUD
7	P-Blister	MRLS
8	NP-Nerve	MRLS
9	P-Nerve	SCUD
10	NP-Nerve	MRLS

STRIKE	AGENT	DELIVERY
1A	P-Nerve	ARTY
1B	P-Nerve	ARTY
1C	P-Nerve	ARTY
2A	P-Nerve	MRLS
3A	P-Blister	SCUD
4A	SP-Nerve	MRLS
5A	P-Blister	SCUD
5B	P-Blister	SCUD
7A	NP-Nerve	MRLS
7B	SP-Nerve	MRLS
7C	P-Nerve	MRLS



CPT Ladd and unidentified soldier before one of the maps used in Dragon Warrior.
Photo by Kelly D. Suñe.

- Presumptive identification of four agents: Anthrax, Plague, Botulinum toxin, and SEB toxin.
 - Contractor logistics support (Detection Components)
- After the speeches and briefings,

soldiers on night shift departed and the soldiers on day shift finished setting up their work cells in preparation for Start-ex.

15 November (2000) Dragon Warrior 96 started with enemy forces

engaging coalition forces after one persistent chemical attack (VX-Nerve) on the 49th Armored Division and one semi-persistent chemical attack (GD-Nerve) on the 4th Infantry Division. By 0600 on 17 November 1996 there had been 11 chemical attacks and 2 biological attacks in III Corps area of operations. To the dismay of BG Yubetcha, Coalition Forces not only survived the chemical and biological attacks, they devastated the Northland Army as they pushed Northland Forces several miles into Northland. The war effort was declared a complete success and coalition forces began redeployment efforts.

The chart (left) illustrates the total number of chemical attacks that occurred before and during the Dragon Warrior 96. The dark stars represent the pre-start-ex chemical attacks and the light stars represent the chemical attacks that occurred during the exercise. The two biological attacks are not represented in this chart because the prediction areas would cover the entire map area on the chart.

Dragon Warrior 96 provided the environment soldiers needed to hone their NBC Warfighting skills while transforming from individual teams into one cohesive Corps team. Included in this "team of teams" is the 75th Division who, from the beginning, was an integral part of Dragon Warrior 96. With this exercise came the lessons learned which now motivate this team of teams to begin planning Dragon Warrior 98.

NBC Defense Operations

—training the combat arms leaders

By Al Mauroni

When the Army re-established the Chemical School at Fort McClellan in 1979 after a decade in exile, the Corps faced a generation of soldiers and leaders that had risen through the ranks with little understanding of nuclear, biological, and chemical defense operations. The Chemical Corps' training strategy to correct this was to develop an infrastructure of professionals at all levels within the Army while developing NBC defense equipment that was easier to employ by non-chemical soldiers. Concurrent with these efforts was a crash program to educate the Army's senior leadership on the Chemical Corps' new responsibilities and capabilities as a combat support branch. Yet, this was not nearly enough.

In March 1991, the GAO reported that the pre-Operation Desert Shield Army was ill-prepared and ill-equipped to survive and sustain combat operations in an NBC-contaminated environment. Because of the Chemical Corps' rebuilt infrastructure, its new doctrine, and new equipment that incorporated training aids in their developmental programs, the Army was able to quickly train and equip itself to raise this low rating in August 1990 to become a fully trained and ready force in February 1991. However, the Army senior leadership remained highly concerned about the operational impact of NBC warfare. They had misgivings

about how successful the Chemical Corps' efforts had been in preparing their troops to survive and sustain operations in an NBC-contaminated environment.

One of the reasons why this doubt existed was these leaders, most entering the Army during the Vietnam period, never had the opportunity to employ chemical defense units as battalion, brigade, or division commanders from 1968 through 1979. No amount of senior-level training and briefings in the late 1980s could replace actual command time and maneuver operations. Yet this mistrust was not a recent epidemic.

Throughout history, the years of chemical-biological weapons threat from 1918 on had not convinced military senior leadership of the value of a Chemical Corps. The Army has recommended downsizing or eliminating the Chemical Corps during most post-war congressional restructuring exercises. This included reviews after World War I, during a downsizing procedure in 1929, immediately after World War II, and after Vietnam in 1972.

In the first case, it was the War Department's reaction against chemical warfare casualties suffered in France. In the other cases, it was more due to the absence of actual chemical-biological weapons employment against US forces. Even after Operation Desert Storm, the military senior leadership

remains unconvinced over the value of the Chemical Corps. The lack of chemical-biological warfare during the Gulf War caused more questions about NBC defense operations than were answered.

One reason may be that the senior leadership has trouble quantifying the value-added of chemical defense units and NBC defense equipment. Unlike conventional weapon systems, the military cannot run live-fire training exercises to evaluate the effectiveness of having one NBC defense program over another, or how the lack of NBC defense equipment correlates to a military unit's success or failure in an operational exercise. Other combat support branches, such as the Engineer or Signal Corps, can easily integrate their missions into large-scale training exercises to yield tangible, positive benefits. The Chemical Corps must show its value-added benefit to military operations in concrete terms of troops and equipment saved, rather than solely using the threatening existence of adversarial nations' chemical-biological warfare stockpiles as their reason to exist.

The key to conducting meaningful, realistic, and effective NBC defense training in units is to first convince unit leaders that NBC defense operations are valuable, and the way to these leaders is through realistic computer war-

gaining demonstrating the value of NBC defense.

Models, Simulations, and Wargames

With the advent of sophisticated automation systems, models, simulations, and wargaming efforts have made dramatic leaps to support the armed forces in training, leadership development, and planning, programming, and budgeting processes. The emphasis on simulation technologies throughout the Army can be seen at any Association of the US Army symposium, as industry scrambles to meet the Army's Force XXI "digitized battlefield" goals. These efforts have become increasingly valuable in the areas of restructuring the total force and identifying the value-added of new equipment designs, especially given increasingly complex weapon systems, expensive testing and requirements, and broader military requirements.

Scientists and engineers within the NBC defense community have traditionally used models to support mate-

riel acquisition program efforts. They can examine how their developmental programs might perform with these computer models before actually producing the hardware. Within the last five years, we've seen the Fox NBC Reconnaissance System simulator, the Automated Nuclear, Biological, and Chemical Information System, the M21 Remote Sensing Chemical Agent Alarm simulator, the Biological Integrated Detector System trainer, Multiple Integrated Chemical Agent Detector, and Joint Warning and Reporting Network and efforts to integrate these systems into Distributed Interactive Simulations.

There are a number of sophisticated simulations that allow operators to envision chemical-biological agent cloud transport over terrain. What we have not seen are chemical-biological agent models and simulations integrated into wargames that demonstrate the operational benefit derived from NBC defense equipment and chemical defense

units. If we cannot show senior leadership (especially service chiefs and CINCs) the value-added benefit of the Chemical Corps in clear, comprehensive, and quantifiable terms of soldiers and equipment saved, it is no wonder that they tend to focus on the Chemical Corps for downsizing options.

How to Show Value-Added

The Department of Defense has never totally ignored NBC warfare. Since the early 1960s, there have been a number of attempts to quantify NBC weapons effects against US forces, particularly in strategic wargames. Because NBC warfare depends so much on weather and terrain characteristics in addition to weapon system and agent characteristics, most wargames simplified NBC agent effects to a degree that led to either one of two conclusions. Either the defending force was virtually annihilated by NBC weapon effects, or defensive equipment was so effective and troops were so well-trained that there were practically no casualties.



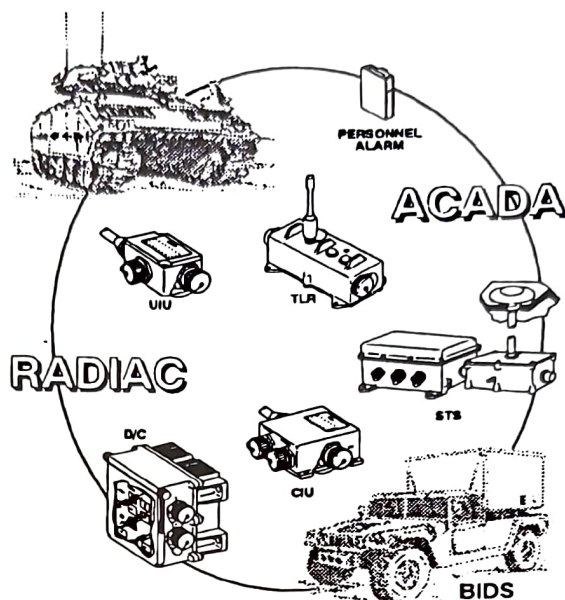
NBC, Fox NBC Reconnaissance System

The first case emphasized the need for retaliatory weapons that ensured adversaries would not use NBC weapons; the latter emphasized individual protective equipment, but implied that NBC warfare was of little concern as long as everyone had a mask and a suit. Neither case offered realistic assessments based on differing training statuses, logistical concerns, operational tempo impacts, or leadership. Detection, decontamination, and collective protection equipment was generally ignored.

This type of wargaming used "low fidelity" simulations; that is, it showed very high-level effects (theater-level) and little to no details as to why events occurred or how they could be influenced by changes in NBC defense doctrine, training, leadership, organization, or material.

The exponential climb in computing power over the last decade has benefited the NBC defense community as well as the rest of the Department of Defense. Increasingly sophisticated computers can simulate agent cloud transport characteristics. Some can simulate specific chemical or biological weapons use against large military units (corps-level) to evaluate the necessary basis of issue for agent detectors (this was done for the BIDS). One remaining difficulty is that chemical-biological agent simulations remain too complex to be directly integrated into standard Distributed Interactive Simulations without massively slowing down the overall wargame, thus slowing down player interaction. In the few cases where the military has attempted to integrate chemical-biological warfare into its wargames, the chemical-biological warfare simulation had to run on a different system and its results relayed to the main exercise.

The usual case in most wargames today is that realistic NBC warfare falls into the "too hard" category and is not effectively demonstrated. We still lack wargames that can realistically replicate CB agent effects against military personnel, equipment, and operational



MICAD Components

tempo, resulting in battlefield effects that influence operational and tactical operations—specifics that combat arms leaders are seeking.

To give a successful example, in the mid-1980s, the Office of the Project Manager for NBC Defense Systems was struggling to justify spending millions of dollars for NBC reconnaissance systems. As difficult as it is to believe today, the Army leadership remained unconvinced that a new NBC Reconnaissance System was worth over a million dollars a copy, especially given the need to produce one hundred-plus systems.

Together with the Army Chemical School, the PM NBC office conducted several wargame studies that compared a US division employing the XM93 NBCRS in a three-day European combat scenario under NBC warfare conditions against the baseline of that division using NBC reconnaissance APCs (M113 chassis). Study results showed that using the XM93 NBCRS would save an average of 2.2 battalion task forces over the baseline. This validated study completely turned decision-maker opinions around, allowing the Fox program to continue receiving funds and support. The main reason

behind this success? The NBC defense community showed valid benefits of employing the NBCRS in tangible terms that the combat arms leaders understood.

Data to translate NBC weapons effects against troops exists in the Combined Arms in a Nuclear/Chemical Environment (CANE) and Physical and Physiological effects from NBC Contamination (P^2NBC^2) studies. Analysts could use this data to develop mathematical models that illustrate casualties and operational degradation effects due to enemy employment of specific NBC weapons and friendly use of NBC defense equipment.

Other guidelines and assumptions need to be developed to account for differing unit training levels, differing leadership levels, and availability of chemical defense unit support. Prior to these models being used in Distributed Interactive Simulations, analysts should team with historians to validate the models against historical results in World War I, the Yemeni and Afghani Civil Wars, and other documented NBC warfare cases.

A second necessary ingredient is the "dumbing down" of current cloud transport models in favor of realisti-

cally portraying NBC weapons effects and NBC defense equipment benefits. This is not "cheating" or unrealistically biasing the wargame. During *Operation Desert Shield/Storm*, the Defense Nuclear Agency ran simulations that varied from individual agent weapon attacks to massed volleys, developing "footprints" of what they expected to see as downwind hazard models.

If these "footprints" were gradually assimilated into a running wargame to mimic cloud transports, much of the excessive computations that slow down the wargame might be avoided. This option would allow the immediate implementation of CANE data into current Distributed Interactive Simulations, while retaining the long-term goal of using realistic cloud transports in all Department of Defense wargames that feature NBC weapons effects.

Where Combat Arms Need Answers

Together, these modifications will allow military senior leadership to see the possible costs and benefits of NBC defense equipment (and the lack thereof). Leaders in all four services need to see for themselves, using their own respective Distributed Interactive Simulations, the operational effects of employing stand-off agent detectors in addition to using point agent detectors.

Does this save ten troops, a hundred, a brigade from contamination during an offensive movement, or is there no real benefit unless in defensive positions only? How should corps commanders dedicate reconnaissance assets to protect their rear area from contamination? How would military supply be affected by contamination of the major ports or airfields? How much does contamination slow down operational tempo of ground forces, air support, or naval support? What are the division consumption rates for protective ensembles and collective protection filters for 120-day major regional contingencies?

There are probably hundreds of such questions that demand answers, but the chemical defense community cannot

answer them with any degree of confidence without a capable simulation such as I have described. In addition to these operational concerns, any simulation efforts must incorporate a joint service approach. Public Law 103-160 specifically calls for the use of wargaming as a tool to develop joint NBC defense programs, doctrine, and training. Future wargames must demonstrate NBC weapon effects on aviators, ships, shore personnel, and troops on the ground, in terms of casualties, equipment losses, NBC defense equipment consumption, and operational tempo.

There are any number of advanced wargaming experiments ongoing throughout the Department of Defense, since all services are trying to identify ways to fight future scenarios with fewer resources, under joint force relationships, and with new doctrinal approaches. The chemical defense community must move swiftly to gain the visibility necessary to influence these combat leaders while they are open to changes in doctrine, operational concepts, and materiel programs. At the same time, these leaders will finally see for themselves the cost and benefits of the Chemical Corps.

Summary

The Chemical Corps has been continuously challenged to demonstrate its value to the armed forces. Because the chemical defense community has always relied on the threat or other nations' NBC weapons arsenals as the validation of their need, there has been little effort to quantify the value-added of NBC defense equipment and chemical defense units.

One aspect to address this need is the development and employment of models, simulations, and wargames that realistically demonstrate NBC weapons effects against troops, their equipment, and operational tempo. In a few instances, such as the NBCRS study that demonstrated savings of 2.2 battalion task forces, the chemical defense com-

munity has been very successful. This approach must be broadened to encompass all NBC defense equipment and doctrine, by enabling current Distributed Interactive Simulations to demonstrate the effects of NBC weapons against troops without unnecessarily slowing down the pace of battle.

Wargames must not only show the benefit of NBC defense equipment, but must allow senior leadership the opportunity to experiment with different mixes of NBC defense equipment, chemical defense units, and under differing weather and terrain conditions. As GEN DuPuy stated in his oral history, "There is no way that we can get the same degree of improved performance (in units) out of some small change in the weapons as we get through the careful selection of people, the training of people, the selection of leaders, and the training of leaders and units." This initiative to develop and broaden the use of NBC warfare models, simulations, and wargaming can be accomplished by:

- Resolving the CANE study results into mathematical models,
- Simplifying cloud transport models in favor of timely, but still realistic, displays of downwind contamination hazards,
- Incorporating these models into current Distributed Interactive Simulations,
- Validating the results with historical scenarios, and
- Participating in as many Department of Defense advanced wargaming exercises as possible.

Each service has its own modeling and simulation community working on similar, parallel efforts in NBC defense. The time has come to focus Department of Defense assets and manpower to support one joint service initiative that will result in effective, quantifiable wargaming analyses that can influence and train senior leadership as to the costs and benefits of NBC defense operations.



M56 Smoke System. (Photo provided by Tropic Test Site, Panama.)

M56/M58 Smoke Systems

—visual and infrared obscuration

By CPT Alayne Cramer

The fielding of the motorized M56 and the mechanized M58 smoke systems will fulfill the Army's need for mobile smoke systems that can selectively provide visual and infrared obscuration. Field commanders identified this need after *Operation Desert Shield* and *Operation Desert Storm*.

Little did commanders and chemical soldiers know that work on a new motorized smoke system began in 1985. With the onset of a Force XXI Army and its use of technology to maintain an edge in projecting, protecting, sustain-

ing, and employing combat power, the new system must defeat all infrared systems of the enemy and the mechanized model must keep pace with the main battle forces. This article will explain why the Army needs a new system, discuss the history of the development of the M56 and M58 systems, and discuss basic system characteristics.

Smoke generators are the only large-area smoke devices available to field commanders. The mechanical smoke generator is used to vaporize fog oil,

which condenses when it strikes the cooler ambient air to form a white smoke cloud. The current fielded M157 smoke generator is mounted on an M1037 HMMWV or on the mechanized version of the M1059 smoke track (M113A2) and both systems produce mobile or static smoke. A big disadvantage to these systems is that they only defeat the visual and near infrared systems of the enemy. Although the M56 cannot keep pace with the main battle forces, it, along with the M58, defeats visual as well as the



M56 Smoke System. (Photo provided by Visual Information Division, CBDCOM.)

system uses a gas turbine engine mounted on an M1113 HMMWV. The M56 started out as a dual-purpose smoke/decon system but the Chemical School dropped the requirement for a hot water decon system in 1989. The M56 ended up as a HMMWV smoke-only system and the Chemical School adopted the XM22 high-pressure washer that is now part of the modular decon system.

Testing of the smoke generator was conducted at Yuma Proving Ground, Dugway Proving Ground, White Sands Missile Range, Cold Regions Test Center, Tropics Test Site, and Aberdeen Test Center between 1991 and 1994. These tests

verified the reliability of the M56/M58 systems and validated the systems' survivability and operation in electromagnetic environmental effects. In December 1993, an M58 underwent testing at Fort Hood, Texas, for one month. Three separate crews operated the vehicle and smoke generation system during a field training exercise. Six M56 systems were operationally tested at Fort McClellan during June 1994.

System Characteristics

The in-process review packets published by CBDCOM also cited the characteristics of each system. The new smoke generator provides visual and infrared obscuration on the battlefield. The generator is a modular system and uses a gas turbine engine as a power source to disseminate obscurants to the atmosphere. The system has five components which work together in providing obscuration for friendly forces and denying the enemy information about friendly activities.

The power module runs on JP or diesel fuels and uses a gas turbine engine that provides electrical power and hot air to operate the system. The

1985 for the development of an improved motorized smoke system was revised to include the mechanized version of the smoke system, or M58.

According to an in-process review packet published by the US Army Chemical and Biological Defense Command (CBDCOM), TRADOC published a Required Operational Capability Memorandum in 1993 and chose the expedient "in-house" development program for the mechanized smoke systems.

Instead of spending a lot of time and money, the idea allowed contractors to develop new smoke generators and combine them with M113 tracks already in the Army system. The "in-house" system fabricated M58 mechanized systems starting with unserviceable M113A2 chassis identified as excess. The M113A2s were upgraded to M113A3s and then the smoke generator systems were integrated to make the M58 system. Red River Army Depot was given the mission producing the "in-house" system and the Project Manager for Smoke/Obscurants (PM Smoke) for the smoke generator components.

The motorized smoke generator

infrared systems of the enemy and will have the future capability of defeating enemy millimeter wavelength systems.

Why does smoke work?

FM 3-50, *Smoke Operations*, states "Smoke placed between a target and viewer degrades the effectiveness of that viewer by interfering with the reflected electromagnetic radiation. Smoke clouds reduce target-to-background contrast, making targets more difficult to detect." Currently, fog oil smoke can produce effective obscuration of the visual through near-infrared portions of the electromagnetic spectrum. The new smoke generator system uses multispectral obscurants that defeat or degrade multiple portions of the electromagnetic spectrum.

Development

The smoke system used on both the M56 and M58 systems was contractor-developed with government guidance and testing. After the Gulf War, commanders realized that potential threat countries were introducing weapons that operated in the visual, infrared, and MMW regions of the electromagnetic spectrum. The idea that began in

infrared module consists of an infrared material hopper, a grinder, a material transport hose, and an air ejector. The hopper holds 360 pounds of graphite (infrared material) and the graphite size is reduced in the grinder and then the air ejector disseminates the graphite into the atmosphere. The visual module uses the same principle as the M157 generator except a turbine engine vaporizes the fog oil.

The M58 system has a 120-gallon fog oil tank and the M56 system has two 62-gallon fog oil tanks. The IR and visual modules can operate at the same time. The control module consists of a control panel, motor controllers (fog oil pump and infrared grinder) and electrical cables. The M56 control panel is mounted in the cab of the M113 and will allow remote operation of the generators from inside the vehicle by the operator or the driver. The MMW module is a future development that will use carbon fibers to screen enemy

millimeter radiation. The M56 system also consists of a frame that provides mounting locations for the power, visual, and infrared models.

As compared to the one-hour visual screen capability of the M157 generator, the turbine smoke generator is 50 percent better. The fog oil for visual obscuration burns at a rate of 1.3 gallons per hour. The graphite for IR obscuration is disseminated (not burned) into the atmosphere at a rate of 10 pounds per minute or 600 pounds per hour. The system is capable of producing 90 minutes of visual smoke and 30 minutes of infrared. The generator system burns 12 gallons of diesel fuel per hour.

The infrared obscurant, graphite, is distributed in 30-pound bags and fog oil is still distributed in 55-gallon drums.

Add-ons for the M58 mechanized system include SINGGARS, the M8A3 gas particulate filter, 66mm smoke grenade launchers, and a driver's thermal

night viewer, which defeats the enemy visual obscuration clouds.

The M56 motorized system along with the trailer-mounted XM22 high-pressure washer will replace the current M1037 with trailer-mounted M17 Sanator for dual-purpose chemical companies.

Environmental Impacts

The Office of the Product Manager for Smoke/Obscurants published a Life Cycle Environmental Assessment in October 1992 which evaluated the impacts anticipated from the turbine-operated smoke generator development and use in peacetime training. Overall, the system does not violate any plans, policies, laws, or controls of either the Federal, state, or local land and water use. Fog oil and graphite do not display any hazardous waste characteristics stated by the Resource Conservation and Recovery Act and neither one of them is listed as a hazardous waste.



M58 Smoke System. (Photo provided by Visual Information Division, CBDCOM.)

Additional military occupational skills or chemical soldiers (as stated by MTOE) are not required to operate or repair the M56/58 systems. New equipment training on the system by PM Smoke will occur as units receive them from FY97 through FY00.

Conclusion

The development of the M56/58 smoke generator system is evidence of the Army's Force XXI plan to redesign its combat power to meet the challenges of a changing world in the 21st Century. Both the M56 and the M58 provide improved safety and operational capability to the soldier and allow field commanders a decisive edge on today's modern battlefield.

We would like to thank Mr. John Judge, M56 Deputy System Manager, PM Smoke/Obsecants, CBDCOM for his expertise and help with this article.

—Editor



M58 Smoke System. (Photo provided by Visual Information Division, CBDCOM.)

The transportation of fog oil, graphite, and carbon filters used by the future MMW module are not regulated as hazardous materials by the Department of Transportation. The 66mm smoke grenades will be labeled and transported as explosives.

Funding and Fielding

Eight M56 systems were provided to the Chemical School in March 1997 as part of a training release. The full release is planned in September 1997 and First Unit Equipped to the 18th Airborne Corps will take place by October 1997. The current program funding will produce 333 M56 systems for Force Package One units at a cost of approximately \$141,000 per system.

One hundred and forty M58 Mechanized Smoke Systems will replace the currently fielded M1059 systems in training and tactical Force Package One units. The unit cost for

140 M58s is \$308,000. Delivery of the systems will occur to units between FY97 and FY00.

All units will receive the smoke generator system at the ratio of one smoke generator system for one M157 or M1059 generator.

Changes in the

Chemical Company Mission?

Upcoming fielding plans for dual-purpose companies include mounting the smoke generator system on HMMWVs and towing the trailer-mounted Modular Decontamination System. These systems will be capable of performing mobile or stationary smoke operations, as well as operational and thorough decon operations. Mechanized smoke units will continue to operate in the main battle area, with limited operations in the covering force area, performing mobile or stationary smoke in support of heavy divisions.

At the time this article was written, CPT Alayne Cramer was attending the chemical officer advanced course. After graduation, she reported to the 1st Infantry Division in Germany. CPT Cramer graduated from the State University of New York at Albany with a BS in biology in 1992. Her previous assignments include assistant S3, battalion S1, mechanized smoke company executive officer, and decontamination platoon leader for the 3d Chemical Battalion at Fort Hood, TX. CPT Cramer is a graduate of the chemical officer basic course.

Directorate of Combat Developments

Director DSN 865-6476
Chief, Program Mgt Office DSN 865-6627
Chief, Concepts, Studies & Org Dv DSN 865-6556
Chief, Materiel Systems Division DSN 865-6609
Chief, Battle Lab Integration Center DSN 865-4691

Joint Warning and Reporting Network (JWARN)

Every chemical soldier has experienced problems with the NBC warning and reporting system. In exercises, too often a blister agent attack inserted at the company level becomes three nerve agent attacks that occurred yesterday by the time the information reaches division headquarters. It has been equated with the parlor game where a story is relayed between individuals and changes a little with each telling until at the end it bears no resemblance to the original tale. The JWARN program is being initiated to improve this situation through the use of automation. The procedures used to convert the observers' reports into predicted hazard areas have been automated. A computer can perform these procedures very quickly and without human errors. The Marine Corps is the lead service and the Army, Navy and Air Force will all participate. The JWARN development is structured in three phases. Phase I will make available off-the-shelf commercial and government software programs to each of the military services. Standards will be prepared in this phase which will allow detectors to interface with networks. Phase II will integrate the automation capability into the standard Command, Control, Communications, Computers, Intelligence, and Information (C⁴I²) systems. Additionally, selected detectors will be connected to send information directly to the these C⁴I² systems. Phase III provides expansion to significantly improve NBC and smoke battlefield management.

Advanced Concept Technology Demonstrations

Advanced Concept Technology Demonstrations (ACTDs) are a means of demonstrating the use of mature technology to address urgent military needs. ACTDs are not formal acquisition programs, although they are designed to provide a residual (stay behind), usable capability for up to two years

upon completion. Sponsoring users are frequently Unified Commanders (CINCs). If the user determines that additional units are desired beyond the residual capability and that these units can be funded, the additional buys become a formal acquisition program. Some ACTDs that are structured to improve aspects of NBC defense are:

Air Base/Port Biodetection ACTD. The objective is to provide an array of capabilities to a select number of critical air bases and ports to achieve the ability to limit the effects of an attack with biological agents. The key components and procedures will be initially demonstrated and evaluated in the United States. Once confidence in the full system is achieved, the plan is to install and operate the capability at foreign APOD/SPOD sites.

911-BIO ACTD. The objective is to demonstrate the integration of state-of-the-art biological detectors, computer modeling tools and information technologies to enhance consequence management following a biological agent incident/attack. Assessment of the military utility of the technologies will be done by the Marine Chem-Bio Incident Response Force (CBIRF) and the Army Technical Escort Unit (TEU).

Counterproliferation ACTD. The objective is to provide a capability to locate, characterize, and strike targets in the production through delivery sequence which will limit the ability to employ NBC capabilities against friendly forces. It is intended that the technologies and procedures will provide a means to predict and limit the collateral effects associated with the strike.

Joint Biological Remote Early Warning System (JBREWS) ACTD. Objective is to provide early warning of biological agent attacks to increase the time available to protect individuals from the effects. The detailed architecture to accomplish the objective is in the formative stages.

Directorate of Training

Director.....	DSN 865-4522
Chief, Chem Defense Training Facility	DSN 865-3786
Chief, Technical Training Department.....	DSN 865-5006
Chief, Reserve Components Tng Mgt Div	DSN 865-5005
Chief, Course Development Div.....	DSN 865-4691
Chief, Tng Devices & Simulations Div	DSN 865-5780
Chief, Training Support Div	DSN 865-5854
Chief, Chemical Training Dept	DSN 865-5962
Chief, Combatting NBC Terrorism.....	DSN 865-4779

Combatting NBC Terrorism Division. This new division was formed to produce training development and instructional support for the following initiatives.

Domestic Preparedness

Shortly after the Tokyo subway incident, we were directed by DoD to develop and conduct a training program that would prepare civilian emergency responders to deal with similar terrorist acts in the US. In October 1995, we began training key personnel from various city-state-federal agencies who, in turn, will train their response teams with the ability to recognize and deal with a chemical or biological incident.

In a year and a half, over 150 training officers and key personnel have completed the course. With the skills and knowledge gained, these individuals have developed and implemented training programs within their own organizations to prepare firefighters, police, and emergency medical personnel to deal with potential chemical or biological incidents.

Force Protection

As most recently demonstrated by the Khobar Towers incident in Saudi Arabia, military installations are not immune to terrorist attacks. Subsequently the threat of a chemical or biological attack is entirely possible. The US Army Military Police School has proponentcy for much of the Force Protection initiatives implemented by Department of the Army. They have developed and implemented a course entitled "Combating Terrorism on Military Installations."

The Course objective is to train installation staff officers and NCOs to develop terrorism counteraction plans and to

implement actions to respond to a terrorist incident. We are working closely with the MP School to ensure that the chemical and biological threat to military installations is properly addressed.

The training needs of emergency response personnel at DoD installations must be met. Without adequate training, installation firefighters and security forces are as vulnerable as their civilian counterparts. We recently conducted training programs for our military police and firefighters. Military Police personnel attended a 4-hour block of instruction developed to provide them with the ability to recognize a potential chemical or biological incident without becoming a casualty themselves. The firefighters participated in an 8-hour block that provided them with the knowledge needed to control or contain the hazard within their capabilities. These same courses will be available to other military installations in the near future.

Counterproliferation

DoD has entered into a partnership with the Federal Bureau of Investigation to develop and conduct a Counterproliferation Training Program for newly independent countries of the Former Soviet Union.

We have agreed to participate as DoD subject matter experts in chemical and biological matters. The first iteration of this course will be taught at the International Law Enforcement Academy in Budapest, Hungary, for selected law enforcement and parliamentary personnel from Kazakhstan in June 1997. One course per month will be conducted until all countries requesting the training are trained.

Directorate Updates

Reserve Component Training Management Division

The Reserve Component Training Management Division is retooling its extremely successful Joint Senior Leader Course for the 21st Century. This course trains senior leaders from all services on NBC defense readiness.

Future courses will have exportable training packages targeting flag officers and an in-house version for senior field

grade officers and command sergeants majors.

The Accreditation Branch of the Reserve Component Training Management Division is currently conducting white hat training assistance visits to all seven of the new Total Army School System (TASS) chemical training battalions nationwide. They are also serving as SMEs for the Total Army training system courseware development.

Directorate of Chemical Branch Readiness

Director DSN 865-3855
Doctrine DSN 865-4080/5531
Analysis DSN 865-5071
New Systems DSN 865-3480
Media..... DSN 865-5928
Library..... DSN 865-4414

FAX DSN 865-5058

Doctrine Division is responsible for the development and publication of Chemical Corps field manuals and training circulars. Since January 1997 CML, we have produced FM 3-101-4, *Biological Defense Platoon Operations TTP* and also have several manuals in various stages of production.

The *NBC Toolbox* consists of reference materials—for example, field manuals, training circulars, and other data bases used by brigade or division chemical sections. There are two ways of getting the *NBC Toolbox*. The easiest way is to get it from the worldwide web: <http://www.arl.mil/nbweb>.

Contact the POC to obtain USERID and Password. To obtain the *NBC Toolbox* on CD Rom, you must mail us a blank, recordable CD Rom disk. Some GSA/SSSC stores carry them; otherwise, you may have to do a local purchase using your organization's VISA card. We have a CD Rom recorder and can copy the data to your CD Rom disk and mail it back to you. This is version 1.0. Future versions depend on available funds for the development. POC is Mr. Cannon.

Doctrine Internet Mailing List is a chemical doctrine LISTSERVER discussion group, an extremely useful tool for sharing information with most chemical officers/NCOs at CINC, MACOM, HQDA, CBDCCOM, USACMLS, Corps Divisions, Brigades. Past messages posted at:

<http://chat.sc.isi.ucf.edu/confs/CHEMICAL-DOCTRINE/>.
Contact the POC (MAJ Avery) for USERID and Password.

Digitized Doctrine. All Army field manuals, ARTEPs/MTPs, GTAs, and so forth, have been digitized and can be viewed at <http://www.atssc.army.org/>. The Army will begin sending both printed and CD Rom versions to publication account holders. POC is MAJ Avery.

Analysis Branch is currently redesigning our NCOES professional development courses to bring them into compliance with the Total Army Training System (TATS). This will be at least a two year contracted project. We will update, revise, and develop new training support packages (TSPs) for tasks that can be used as stand-alone, distributed training-distance learning courseware. These exportable training packages will be created in both print and multimedia formats. We completed ARTEP 3-7-10-MTP, *Mechanized Smoke Platoon*; ARTEP 3-207-10-MTP, *NBC Recon Platoon (M113/HMMWV)*; ARTEP 3-477-10-MTP, *BIDS Platoon* and ARTEP 3-457-10-DRILL, *Smoke/Decon Platoon*, and the horizontal alignment of chemical officer and enlisted tasks.

New Systems Training Division is the point of contact for Army Modernization Training which includes WARNET



SSG Darion Moore models the OSHA Level A training suit during the Concept Evaluation Program. See page 5.

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