ARMY LOGISTICIAN

SEPTEMBER-OCTOBER 1998

Information Age Technology

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COVER

Information Age technology is being incorporated in all combat service support operations. These photos, provided by the Army Office of the Chief of Public Affairs, show the digitally equipped soldier (center), the palletized loading system (above), and the Hercules recovery vehicle (below). This issue of ***Army Logistician*** contains a number of articles that describe the Army's progress toward Army XXI, including the announcement of a new design for the heavy division (see next page).

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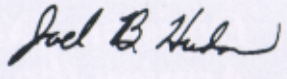
This medium is approved for the official dissemination of material designed to keep individuals within the Army knowledgeable of current and emerging developments within their areas of expertise for the purpose of enhancing their professional development.

By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:



JOEL B. HUDSON
Administrative Assistant
to the Secretary of the Army
04885

Coming in Future Issues—

- ULLS Gunnery
- Supplying the Chemical Warfare Service in World War I
- Using Laptop Computers for ULLS-G
- Lift Mission in Bosnia
- Using Bar-Code Technology With ULLS
- Measuring Joint Theater Distribution
- A Medical Unit EXTEV
- Knowledge-Based Logistics
- A Unique Unit With a Unique Challenge
- Contractors on the Battlefield
- Distribution Management Field Studies Program
- Arctic Maintenance Battle Drills
- EAGLE—Improving National Guard Logistics
- Training the Force XXI Multicapable Mechanic
- National Guard's Pollution Prevention Internet Initiative

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ALOG LOG NOTES

Working Outside the Wire

In my opinion, Captain McLamb's article, "Defending Outside the Wire," in the May-June issue was on target.

In April 1991, I had the pleasure of commanding the 225th Forward Support Battalion (FSB) supporting 2/25th Infantry Division at the Joint Readiness Training Center, then located at Fort Chaffee, Arkansas. Our experience confirms that a trained infantry force working outside the wire significantly deters the opposing force's (OPFOR's) ability to gain "eyes on" and disrupts their ability to remain in close proximity to the BSA (brigade support area). Further, we had the ability to defeat the OPFOR outside the wire through maneuver of the infantry (working outside the wire) and military police forces working the main supply route. This in turn enhanced our ability to defend the BSA wire and support the brigade task force with the soldiers inside the wire.

As noted in the article, the S2 and S3 must be trained in basic defense and reconnaissance and surveillance procedures. Further, it is very important for the FSB S3 to have a solid working relationship with the infantry brigade S3. Our experience was that the brigade S3's support for this concept was essential for success.

Colonel David L. Nolan
Fort Lewis, Washington

Truck Designs Questioned

I enjoyed reading the article about the 2d Armored Cavalry Regiment's first foray into an National Training Center rotation (page 24, May-June issue). I'm glad to see my former unit is not allowing grass to grow beneath it and that they are still "Toujours Prêt!"(Always Ready).

I find it very interesting that a vehicle we've purchased for use in a tactical situation in any environment could succumb to so many maladies during an NTC rotation. If it is a tactical vehicle, one would assume that it would be tested as it will be used. Quite possibly, the things the regimental combat team (RCT) found out might have been discovered during testing later. Rattling side panels, tires not sturdy enough for tactical use, and an insufficient fuel capability? Were we designing an over-the-road truck here, or one for use in a combat theater of operations? When testing, were the drivers the same ones who will use it in day-to-day use, or were they licensed over-the-road drivers? One is much different from the other. For example, trained truck drivers can back any trailer with ease, whereas most soldiers don't have that experience.

The FMTV (family of medium tactical vehicles) must be able to operate in desert, woodland, and, yes, urban environments. Yet, those who design and test vehicles may not be taking these factors into consideration. If we are designing tactical vehicles for use only in the woods or desert, then we are setting ourselves up for failure. Last time I looked, almost all Army posts, camps, and stations are located in or near cities. And to get to a port, transportation facility, or railhead, a vehicle will have to travel highways and local roads. A truck will have to be able to travel on these roads both loaded with cargo and empty, and it will have to be able to travel at least at the minimum speed limit for these highways.

Chris Cullen
Fort Drum, New York

More on Ammo Management

I do not agree with the views expressed by the author in the article titled "Rethinking Ammunition Management" in the May-June 1998 issue. It appears as if the author has confused the training a soldier receives with leadership's failure to make use of this training. Our 55B soldiers aren't afforded the level and amount of training experienced by the combat arms soldiers. In peacetime, the 55B's may not always be gainfully employed in their MOS, but it is the responsibility of leadership to ensure that the 55B's are not primarily fuel handlers or rock painters. If they are, then it doesn't reflect on their lack of training, but on their leadership. Furthermore, if a 55B is not performing a duty, such as vehicle inspections, because the civilian QASAS is performing this mission, then again, this is a leadership problem.

We are making major changes in the ammunition logistics arena and how the combat forces will be supported in the future. We often say, "A little knowledge can be dangerous." But the statement, "ammunition is no harder to store than Class III items," not only could be dangerous; it could be catastrophic. We need to have an open mind and make changes where they make sense. But don't propose changes blindly and call it a vision without first determining across-the-board impacts and weighing the ramifications.

Cecil R. Doub
Redstone Arsenal, Alabama

Note: See related article on this subject on page 41 of this issue. —Editor

Log Notes lets you share your thoughts on logistics. You may want to comment on an *Army Logistician* article, take issue with something we've published or something happening in logistics, or share an idea on how to do things better. Your letter will be edited only to meet style and space constraints. All letters must be signed and include a return address; at your request, your name will not be published. Mail letters to EDITOR ARMY LOGISTICIAN, ALMC SUITE C300, 2401 QUARTERS ROAD, FT LEE VA 23801-1705; send them by FAX to (804) 765-4463 or DSN 539-4463; or e-mail to alog@lee-dns1.army.mil.

ALOG NEWS

CAPTAINS CAREER COURSE REPLACES CLOAC

Beginning in October 1998, the Combined Logistics Officer Advanced Course (CLOAC) will be replaced by the 24-week, four-phase Combined Logistics Captains Career Course (CLC^3). Since its inception, CLOAC had been a 20-week, three-phase course.

The CLC^3 combines CLOAC and the Combined Arms and Services Staff School (CAS^3) at Fort Leavenworth, Kansas, into one course for logistics officers. It was created as a result of a recommendation of the Captains Professional Military Education (CPT PME) Study. Similarly, that study recommended that other officer advanced courses be replaced by branch-specific captains career courses that also incorporate the CAS^3 curriculum.

Graduates of CLC^3 will receive one diploma and one academic efficiency report. Army active-duty officers attending CLC^3 will continue to be assigned as a permanent change of station to the Army Logistics Management College, Fort Lee, Virginia, where Phase 1 (reduced to 5 weeks) and Phase 3 (8 weeks) will be taught. The 5-week Phase 2 of CLC^3 will continue to be taught at the various branch school locations with students attending on a temporary-duty-and-return basis. The 6-week staff process training at Fort Leavenworth (also attended on a temporary-duty-and-return basis) will constitute Phase 4 of CLC^3.

Students from other military services and international military students will not attend Phase 4 of CLC^3. Army National Guard and Army Reserve students must obtain separate quotas for Phase 4 of CLC^3 through National Guard Bureau and Army Reserve Personnel Command channels, respectively.

TRADOC CONVERTS TO PAPERLESS CONTRACTING

When its directorates of contracting (DOC's) convert to the Standard Procurement System (SPS) in December, the Army Training and Doctrine Command (TRADOC), Fort Monroe, Virginia, will become the first major Army command to implement paperless contracting.

The Deputy Secretary of Defense, Dr. John J. Hamre, directed the Department of Defense (DOD) to move to a paperless contracting process by 1 January 2000. The SPS is considered to be pivotal to accomplishing that goal.

Web sites at major command, department, and DOD levels will list each contract solicitation and include a brief description of services or supplies sought. Contractors will be able to access these repositories and compete with other companies for the contract. The web sites also will include instructions on preparing and submitting bids electronically.

"This is just the first step toward performing Government-wide functions electronically," said Colonel David Clagett, Jr., TRADOC's Director of Contracting. "Contracting was probably the best place for the Department of Defense to start if they wanted to make a significant difference and save tremendous amounts of money."

According to Lieutenant Colonel Cleo Mackey, chief of the Requirements and Management Division in TRADOC's Acquisition Directorate, savings will be gained by streamlining the contracting process and saving untold quantities of paper rather than eliminating employees. "The need for a highly trained and experienced force of contracting professionals won't change," he said.

Installation DOC's will indoctrinate the customers they serve and their local business communities on the new contracting process. Software that enables customers to write their requirements in the proper format is part of base operations information management systems that are being fielded throughout the Army.

BEATING THE YEAR 2000 CLOCK

"This is a national problem," said Lieutenant General William H. Campbell, Director of Information Systems for Command, Control, Communications, and Computers, Department of the Army. He was referring to the $366 million the Army will spend to fix computer problems caused by the year 2000 (Y2K).

Because many computers are not set to change over from the 1900's to 2000, they either could revert back to 1900 or shut down completely. General Campbell illustrated the scope of the problem with a question to the Army Corps of Engineers: "Are you guys sure you don't have embedded microprocessors in dams and locks?"

"There is no new funding to pay for this fix," Campbell said. He is drawing funds from other accounts to work on the problem.

The Y2K dilemma could have a big impact on the Army's plan to digitize a division by 2000 and a corps

by 2004. "There are 500 programs involved in this effort," Campbell said. It includes everything from Joint STARS to special radar to the command and control vehicle." (STARS stands for Surveillance and Target Attack Radar System, a long-range, air-to-ground surveillance and battle management system.)

General Campbell added that, because the Army is based primarily in the continental United States, it also is important that computer and communications systems be improved here, including the Pentagon. "We have to digitize the sustaining base as well," he said. "Clearly, if we are going to work in the Information Age, we have to make the investment now."

DDLP MAINTENANCE FUNCTIONS REALIGNED

Effective immediately, only major end items with a programmed maintenance requirement should be sent to Letterkenny Army Depot, Chambersburg, Pennsylvania, for repair. This change results from the 1995 Base Realignment and Closure Commission's decision to close the Defense Distribution Depot (DDLP) on 1 October 1998.

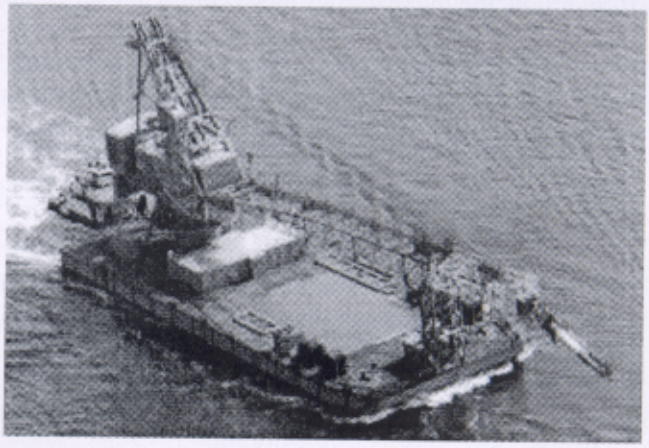
A satellite element of the Defense Distribution Depot at Susquehanna, Pennsylvania (DDSP), known as DDSP South, will support Army class VII (major end items) maintenance requirements at Letterkenny. Class IX (repair parts and components) for which Letterkenny has the repair mission should be sent to DDSP also. All other materiel should be sent to the repair depot designated in the automatic return item listing.

For information concerning specific items, contact the appropriate inventory item manager. Other questions should be directed to Martin Elkins at (703) 617–8369 or DSN 767–8369 (e-mail melkins@hqamc.army.mil).

ARMY'S LARGEST BARGE DERRICK CHRISTENED

The largest and most mission-capable barge derrick in the Army's equipment inventory was christened last June in Baltimore, Maryland. The *Keystone State* is basically a 200-foot-long, 80-foot-wide floating crane. The first new floating crane to be built for the Army in 40 years, the *Keystone State* will be used to load and discharge cargo that is beyond the operating capacity of an average ship's lift system. It has a lift capacity of 115 tons, which means it can lift and discharge an M1A2 Abrams tank from the deck of the Navy's largest cargo ship. The barge derrick will work with Military Sealift Command ships as well as with commercially operated ships. Its size and mission flexibility will enable faster, safer, and more efficient cargo transfers during training or actual mobilization.

The *Keystone State* (below) was named in honor of 13 Pennsylvania reservists from the 14th Quartermaster Detachment who died when a Scud missile hit their barracks in Dhahran, Saudi Arabia, in 1991.



FUTURE OF ARMOR IS CLEAR

Engineers at the Army Research Laboratory's (ARL's) Weapons and Materials Research Directorate at Aberdeen Proving Ground, Maryland, are working to develop transparent armor that will provide better ballistic protection in thinner, lighter weight assemblies. The transparent armor will be more efficient, have lower life cycle costs, and last longer than traditional armor.

Ceramic materials, such as ALON, an aluminum oxynitride, and magnesium aluminate spinel, are harder and offer superior ballistic protection versus conventional glass or plastic armor systems. Recent research has shown that using ALON can reduce the weight of transparent armor by over 50 percent and still repel 7.62-mm armor-piercing threats. However, cost and the difficulty of producing large pieces of such materials have prevented their widespread use.

ARL is focusing on developing the process of creating large assemblies that can be used for real applications, such as a windshield for a high-mobility, multipurpose wheeled vehicle (HMMWV). A lighter vehicle is faster, requires less maintenance, and uses less fuel. Thinner armor leaves more interior room for soldiers and cargo.

ARL and the Natick Research, Development, and Engineering Center in Massachusetts are working together to develop a face plate of transparent armor that will offer increased individual protection for soldiers involved in hazardous tasks such as ordnance disposal. Their goal is to make it equal in ballistic protection to the Kevlar helmet.

Light transmission for visibility is an important consideration in all applications of the proposed transparent armor. For certain tasks, such as piloting helicopters while wearing night-vision devices, distortion-free visibility is critical.

Researchers estimate that they are about a year away from producing the materials they need. They will continue to look at ALON and similar materials. At the same time, they will look for cheaper ways to produce those materials and at less expensive materials such as glass ceramics and high-hardness, low-density glass.

AORS SCHEDULED

The annual Army Operations Research Symposium (AORS) will take place at the Army Logistics Management College, Fort Lee, Virginia, 13 to 15 October 1998. This year's theme is, "Discovery Through Operations Research." Additional information can be found on the AORS website: http://aors.army.mil.

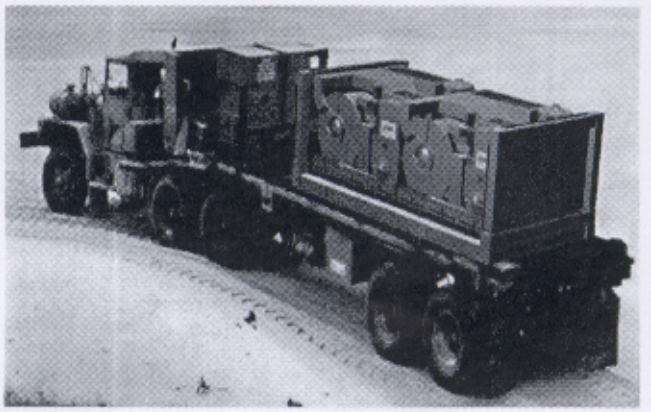
NEW SOLDIER SUPPORT EQUIPMENT ENHANCES QUALITY OF LIFE

Four new logistics systems introduced recently by the Office of the Product Manager-Soldier Support, Army Soldier Systems Command, Natick, Massachusetts, will weigh less, cost less, and require less manpower to use than current systems, significantly improving life for soldiers in the field—

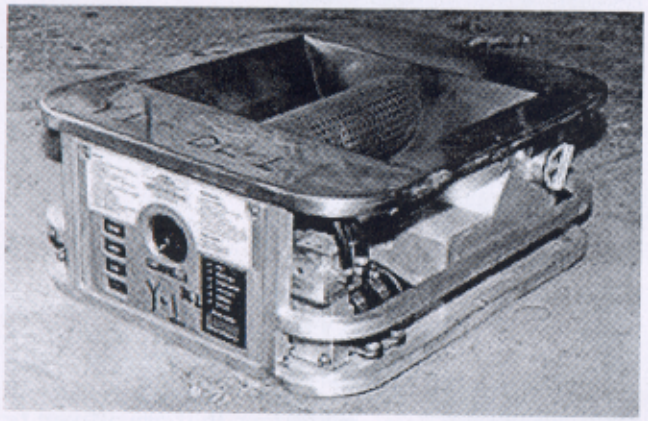
- The new lightweight maintenance enclosure (LME) is an easy-to-erect shelter for tactical maintenance operations. It takes 12 soldiers only 35 minutes to set up, compared to the old shelter, which took 8 soldiers 3 to 4 hours to erect. It is 32 feet long, 24 feet wide, and 13 1/2 feet high and can accommodate oversized vehicles. The LME can be extended in length by joining additional LME's.

- The new modular general-purpose tent system (MGPTS) will replace the large, bulky, and frequently leaky general-purpose tents currently used by troops in the field. The new system has fewer poles and uses a modular design that allows units to connect 18-foot sections of the system together to create the space they need. The MGPTS has heat-sealed, leakproof seams and uses tensioned fabric that distributes wind, rain, and snow from the fabric directly to the supporting poles.

- The new laundry advanced system (LADS) will replace the current M85 field laundry systems, with one LADS doing the work of four M85's. Each LADS consists of laundry processing and water-cycling equipment mounted on a flatrack, with the flatrack and a 30-kilowatt generator mounted on a 30-foot trailer. A 5-ton tractor tows the system. Each LADS can support 500 soldiers in the field and can process 400 pounds of laundry per hour. The recycling feature of the LADS reduces water usage from 24,000 gallons a day to 500 gallons a day. Wastewater is reduced from 20,000 gallons per day to 40 gallons per day. Only two soldiers are required to operate the system, down from the eight soldiers needed to operate four M85 laundries.



• The modern burner unit (MBU) will replace the M2 gasoline burner now used in all field feeding systems. The new unit uses the less volatile JP8 fuel instead of gasoline, so it can be lit inside the kitchen, unlike the M2 burner, which had to be lit outside and carried inside after preheating



RESERVE COMPONENT OFFICERS SATISFY FA 90 REQUIREMENT THROUGH ALEDC

As of 1 July, reserve component captains can complete either phase I of the Associate Logistics Executive Development Course (ALEDC) or the Reserve Component Multifunctional Combat Service Support (RCMCSS) Course to meet the education requirements for functional area (FA) 90, Logistics. ALEDC and RCMCSS are offered by the Army Logistics Management College at Fort Lee, Virginia. To meet the FA 90 requirement, ALEDC must be taken in residence at ALMC. Completion of RCMCSS earns students credit for completing ALEDC phase I.

ALEDC serves as the Army's senior logistics course for reserve component officers and civilian managers. As a resident course, it lasts 10 weeks and is organized into 5 phases. ALEDC also is available as a correspondence course lasting 499 hours. ALEDC provides insights into the multifunctional areas of logistics and their integration within the Department of Defense (DOD). Students gain a fuller understanding of the interface among the Army in the field, the DOD logistics structure, and industry and enhance their fundamental management skills. Completing ALEDC qualifies a reserve component officer for promotion to lieutenant colonel.

Students enrolled in ALEDC are required to complete the course within 4 years. If a student does not complete the course within 4 years, he will be dropped from the course rolls automatically and will be required to repeat the entire course.

RCMCSS is a 2-week course offered in residence at ALMC or on site. It trains students for positions as multifunctional officers in multifunctional combat service support organizations.

For more information, call (804) 765-4750 (DSN 539-4750) or (804) 765-4752 (DSN 539-4752) or e-mail edwardsp@lee-dns1.army.mil or jonesr@lee-dns1.army.mil.

ARMY RECOGNIZES MAINTENANCE UNITS

The Army Chief of Staff presented Army Awards for Maintenance Excellence to the following winning units in a ceremony at the Pentagon last June—

Active Army (Modification Table of Organization and Equipment) (MTOE)

Light. 1097th Transportation Company, Rodman Naval Station, Panama.
Intermediate. 109th Transportation Company, Mannheim, Germany.
Heavy. 532d Military Intelligence Battalion, Seoul, Korea.

Active Army (Table of Distribution and Allowances)

Light. Ground Mobility Division, 1st Battalion, 81st Armor, Fort Knox, Kentucky.
Intermediate. Jungle Operations Training Battalion, Fort Sherman, Panama.
Heavy. 751st Military Intelligence Battalion, Camp Humphries, Korea.

Army National Guard (MTOE)

Light. 1031st Engineer Company, Gate City, Virginia.
Intermediate. Company B (Maintenance), 429th Support Battalion, Richmond, Virginia.
Heavy. Company D, 109th Aviation Battalion, Johnson, Iowa.

Army Reserve (MTOE)

Light. 125th Transportation Company, Lexington, Kentucky.
Intermediate. Headquarters and Headquarters Company, 300th Support Group (Area), Fort Lee, Virginia.
Heavy. 371st Chemical Company (Smoke/Decontamination), Greenwood, South Carolina.

ARMY SEEKS FY 2000 SEP PROPOSALS

The Army is accepting new start candidates for the fiscal year (FY) 2000 Soldier Enhancement Program (SEP). The purpose of the SEP is to accelerate the acquisition of lighter, more lethal weapons and improved

"soldier items of equipment" and get the new equipment in the hands of soldiers in 3 years or less.

Since 1990, the Army has actively sought common-sense solutions from soldiers to enhance their lethality, mobility, and survivability on the battlefield through the SEP. The SEP is not an incentive award program. No monetary awards will be given for proposals that are adopted for use and result in a cost savings to the Government.

SEP candidates must be items of equipment that are worn, carried, or consumed for individual use in a tactical environment. They must be commercially available (off the shelf, with little or no modification for field military use) and must satisfy operational needs or battlefield deficiencies.

Nine programs are expected to conclude in 1998. These are the stabilized binoculars; soldier intercom; the compression sack; the combat medic vest; the anti-reflection device; equipment belt extender; knee and elbow pads; ballistic shin guards; and ballistic/nonballistic face and body shields. These items should begin fielding in the next few months.

During the February 1998 annual SEP review, the executive council approved the following 13 programs as FY 1999 new starts: 40-millimeter (M203) improved munitions; M240 machinegun dismount kit; medium sniper rifle system; improved entrenching tool; stab-protective body armor; individual camouflage system; land mine probe; thermal camouflage face paint; improved pistol holster/harness for soldiers; cold weather fuel handler's gloves; tactical search/inspection mirrors; low cost absorbent/moisture transfer undershirts; and individual riot control agent neutralizer.

To request a form for use in submitting FY 2000 SEP proposals, write to the Army Training and Doctrine Command System Manager-Soldier, ATTN: ATZB-TS, Fort Benning, Georgia 31905-5000; call (706) 545-1189 (DSN 835-1189); or fax a request to (706) 545-1377 (DSN 835-1377).

ROBOTS TO PATROL WAREHOUSES

If initial tests are successful, the Army will be using robots to patrol storage areas by the year 2000. The mobile detection assessment response system (MDARS) robot can patrol a warehouse or other structure, take inventory with an on-board radio frequency (RF) interrogator, check for intruders, and detect environmental threats such as fire, water main leaks, and chemical spills.

☐ As it patrols a warehouse at Anniston Army Depot, the MDARS robot reads RF tags that are affixed to items in storage.

Development of the MDARS robot was a joint service and industry effort. It is being tested at the Defense Distribution Depot Anniston, Alabama, before the advanced structure design and software interfaces are selected and developed.

The robot can conduct continuous surveillance along one of several pre-established paths, steer itself to stay on the path and avoid obstacles, and inventory specified items as it moves through a storage area. The robot's built-in RF interrogator scans RF tags affixed to items in storage and sends the information to a collection point for appropriate action.

The MDARS robot reduces the need for safety and inventory control personnel and can help prevent losses of high-dollar or controlled items. Other benefits anticipated with the use of the robots include improved inventory control, reduced risk to security personnel, and quick detection of intruders, fire, and toxic spills. Future plans include linking the MDARS RF-based product assessment system to other depot systems, such as the Distribution Standard System (DSS).

For more information, call Jerry Edwards, Office of the Product Manager for Physical Security Equipment, Army Materiel Command, Fort Belvoir, Virginia, at (703) 704-2412 or DSN 654-2412, or send e-mail to jedwards @belvoir.army.mil.

SUPPLY AWARDS ANNOUNCED

The winners of the 1998 Supply Excellence Awards presented by the Army Chief of Staff are—

* U.S. GOVERMENT PRINTING OFFICE 1998 - 418-313-60006

Active Army

Company With Property Book. 56th Army Band, Fort Lewis, Washington.
Company Without Property Book. 534th Military Police Company, Fort Clayton, Panama.
Battalion With Property Book. 28th Transportation Battalion, Mannheim, Germany.
Battalion Without Property Book. 112th Signal Battalion, Fort Bragg, North Carolina.
TDA Upper Level. United Nations Security Force, Joint Security Area, Panmunjom, Korea.
TDA Lower Level. A Company, 35th Engineer Battalion, Fort Leonard Wood, Missouri.
Supply Support Activity Small. 3d Maintenance Company, 1st Battalion, 43d Air Defense Artillery Regiment, Suwon, Korea.
Supply Support Activity Medium. 80th Area Support Group, Chievres, Belgium.
Supply Support Activity Large. D Company, 701st Main Support Battalion, 1st Infantry Division (Mechanized), Kitzingen, Germany.

Army National Guard

Company With Property Book. Headquarters and Headquarters Company, 30th Engineer Brigade, Charlotte, North Carolina.
Company Without Property Book. 43d Army Band, Lincoln, Nebraska.
Battalion With Property Book. 109th Medical Battalion, Iowa City, Iowa.
Battalion Without Property Book. 1st Armored Battalion, 632d Armored Regiment, Wausau, Wisconsin.
TDA Upper Level. Headquarters and Headquarters Detachment, State Area Command, Jackson, Mississippi.
TDA Lower Level. 90th Troop Command, Oklahoma City, Oklahoma.
Supply Support Activity Small. U.S. Property and Fiscal Office-West Virginia, Buckhannon, West Virginia.

Army Reserve

Company With Property Book. 425th Transportation Company, Salina, Kansas.
Company Without Property Book. Headquarters and Headquarters Company, 300th Support Group, Fort Lee, Virginia.
Battalion With Property Book. 325th Field Hospital, Independence, Missouri.
Battalion Without Property Book. 12th Psychological Operations Battalion, Moffett Field, California.
TDA Upper Level. 1395th Transportation Terminal Brigade, Seattle, Washington.

LOG MANAGERS' CONFERENCE SET

The annual conference of the Council of Logistics Management will be held 11 to 14 October at the Anaheim Convention Center, Anaheim, California. This year's conference theme is "Logistics Excellence: Vision, Processes, and People."

Registration information will be mailed to council members. Nonmembers who would like to receive registration information should fax their request to (630) 574-0989, e-mail a request to clmadmin@clm1.org, or write to Conference Registrar, Council of Logistics Management, 2805 Butterfield Road #200, Oak Brook, Illinois 60523. The Council's website, www.clm1.org, contains current conference information.

New Division Design Centralizes CSS

The Army unveils a new heavy division that incorporates Information Age technologies. For logisticians, the new design means a centralized support structure and an anticipatory, distribution-based support system.

The Army of the future took a major step toward reality on 9 June with the announcement of the new design for the heavy division. As General Dennis J. Reimer, the Chief of Staff of the Army, observed of the new design—

> Today is an important day in the Army's history. The division design is one of our key milestones as we prepare for the 21st century. We have developed a division that is strategically deployable, agile, flexible, and the type of decisive, full-spectrum force we need in the 21st century. The new division design takes full advantage of Information Age technologies and new modular distribution systems. It is also an important step toward fully integrating active and reserve component forces.

The new division will be smaller and somewhat lighter than the current division, but more lethal and more rapidly deployable. It will be capable of fighting across the larger, noncontiguous, nonlinear battlefield environment of the future foreseen by Army planners. And its logistics support will be based on two significant innovations: a centralized combat service support (CSS) structure and a distribution-based, anticipatory logistics support concept.

According to General William W. Hartzog, the commander of the Army Training and Doctrine Command and the senior architect of the division redesign, "By far the most significant change is the command and control apparatus . . . This is a near paperless operation in that most of the information passes back and forth at the speed of computers." When combined with new weapons systems, this digitized communications capability—which will greatly increase situational awareness on the battlefield—will create a more lethal and responsive combat force.

Selecting a New Division Design

The division redesign is the result of a study begun in 1994 under Force XXI to find a successor to the Army of Excellence (AOE) division. The AOE division, designed and fielded from 1984 to 1986, was configured primarily to fight Warsaw Pact forces in Europe. The AOE heavy division has 18,069 soldiers (at any given time, on-the-ground strength of actual divisions can vary) and is a heavily armored force. However, with the end of the Cold War and post-Cold War reductions in military spending, the Army decided that a new division was needed to meet the changed geopolitical and fiscal realities.

Army force developers originally considered 11 possible designs for the new heavy division. After much analysis, the 11 alternatives were reduced to 3: a strike force division, which incorporated a large force of helicopters; a "brigadist" division, which was a loosely bound organization of several brigades; and a "conservative heavy" division. Following testing, including the Task Force Advanced Warfighting Experiment (AWE) in March 1997 and the Division AWE in November 1997, the Army selected the conservative heavy division design. Analysis found that the strike force design had the greatest lethality and the second highest rate of survivability, but the highest cost. The brigadist organization was the least lethal and survivable of the three options; the Army found that the brigades fought well separately against small threats but did not coalesce well against a major opponent. The conservative heavy division was not quite as lethal as the strike force, but it ranked first in survivability and was the easiest to sustain.

New Structure

The new heavy division will have a strength of 15,719 soldiers, down 2,350 (or 13 percent) from the AOE division. Of this strength, 15,302 will be active-duty soldiers and 417 will be reserve component (RC) soldiers integrated into the division when it deploys. The division will have organic RC positions and organizations. The RC soldiers will perform various command and control and staff augmentation, signal, aviation support, maintenance, and medical missions.

The basic structure of the new heavy division will

look like that of the AOE division: three maneuver brigades (one armored and two mechanized infantry), division artillery, aviation brigade, division support command (DISCOM), and several separate battalions. However, there will be significant changes within those organizations.

Each of the nine maneuver battalions (three in each brigade) will have three instead of four companies. Each armored battalion will have 45 of the Army's latest tank model, the M1A2 Abrams, and each mechanized infantry battalion will have 45 new M2A3 Bradley fighting vehicles. (Each battalion now has 58 tanks or fighting vehicles.) Each maneuver brigade will have its own scout capability in the form of a brigade reconnaissance troop.

Innovative Combat Service Support

Changes in CSS are needed to support the larger, faster, nonlinear battlefield on which the new heavy division will operate. As explained by Colonel John D. Kennedy of the CSS Battle Lab at Fort Lee, Virginia—

> To achieve [the necessary] agility and mobility, we had to get rid of all of those stocks that we carry around with us on the battlefield. We had to change our logistics concepts so that we could keep up with maneuver commanders and allow them to maintain their momentum.

To achieve this capability, support will change from a reactive, supply-based system, in which large quantities of materiel are stockpiled to meet the incoming demands of maneuver commanders, to an anticipatory, distribution-based system, in which logisticians use their information capabilities to anticipate demands and get supplies where needed, when needed.

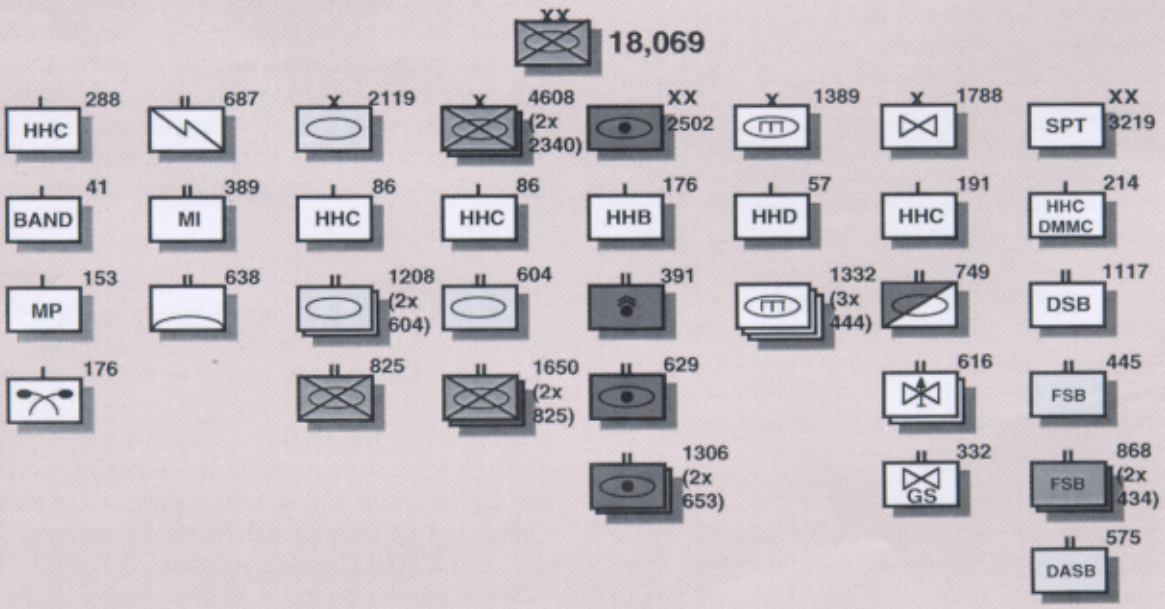
In the new division, CSS will be centralized: CSS assets previously in maneuver units will be reorganized and assigned to the DISCOM, and control of CSS will move from the commanders of the maneuver battalions to the CSS chain of command. Each maneuver brigade will receive support from a forward support battalion, and each maneuver battalion will be supported by a forward support company. According to Kennedy—

> Because of situational awareness, the forward support battalion commander is much more able to anticipate the requirements of the supported maneuver commander and begin pulling CSS capabilities through the logistics pipeline. Even before the brigade commander realizes he needs it, the logistician should have already anticipated that requirement. The same thing is repeated down at the maneuver battalion level with the relationship between the forward support company commander and the maneuver battalion commander.

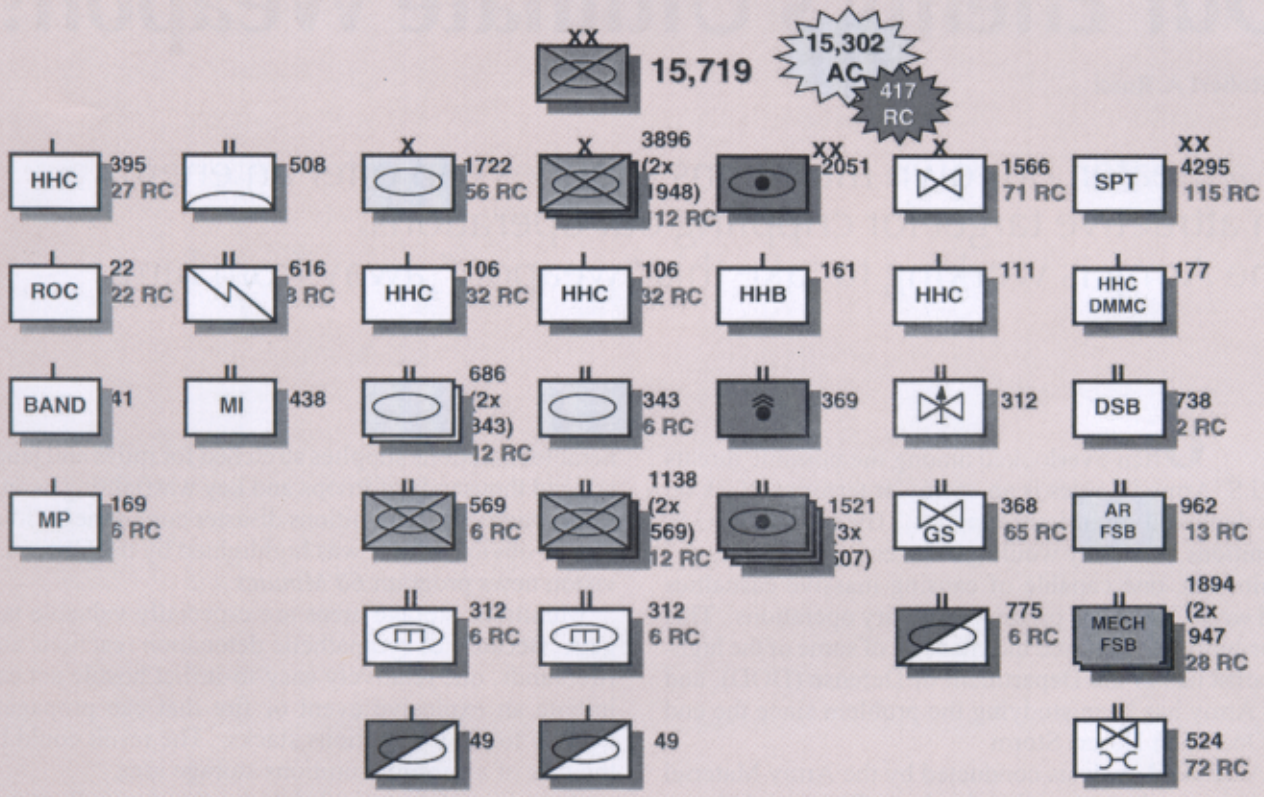
The CSS capabilities required for the new heavy division will be attained by such innovations as—

- The CSS Control System.
- The Mobility Tracking System.
- The Forward Repair System–Heavy (FRS-H) vehicle, which will function as a front-line maintenance workstation capable of lifting tank engines. Fielding of the FRS-H will free the M88 recovery vehicle to concentrate on its recovery mission.

ARMY OF EXCELLENCE DIVISION



NEW DIVISION DESIGN



• "Multicapable" mechanics, who can perform both organizational and direct-support repairs. These mechanics will be trained to replace equipment components forward and fix vehicles in the rear.

Making the New Design a Reality

The 4th Infantry Division (Mechanized) at Fort Hood, Texas, which has been serving as the Force XXI Experimental Force, will be the first division to convert to the new heavy division design. It will have the majority of its new capabilities in place in 2000. The Army plans to convert the 1st Cavalry Division, also at Fort Hood, to the new design in 2003, and make III Corps into the Army's first digitized corps in 2004.

The Army also is working to modernize its light forces. The XVIII Airborne Corps at Fort Bragg, North Carolina, and the Army Infantry Center and School at Fort Benning, Georgia, are leading the effort to develop a new light division design. The 10th Mountain Division (Light Infantry), at Fort Drum, New York, will conduct most of the light division experimentation. A fast, lethal strike force of no more than 5,000 soldiers that can be deployed in 5 days or less also is under development. The 2d Armored Cavalry Regiment at Fort Polk, Louisiana, will conduct strike force experimentation.

As General Hartzog noted, "The Army is moving itself into the Information Age." The goal is to use Information Age capabilities to make a quantum leap forward in the Army's survivability, lethality, operational tempo, sustainability, deployability, versatility, and ability to participate in joint and combined operations. The new heavy division design is a major milestone on the road to Army XXI. ALOG

Army Logistician *thanks Jim Caldwell of the Army Training and Doctrine Command Public Affairs Office at Fort Monroe, Virginia, for his assistance in writing this article.*

Our Enemy's Ultimate Weapon?

by Robert A. Rossi

In a theater, our own munitions supplies can offer an enemy an attractive target for crippling our operations. The Army is working to take this "weapon" away from him.

Often overlooked among the possible threats to U.S. Armed Forces is an enemy or terrorist attack on our deployed munitions supplies. By exploding U.S. munitions, an enemy would gain an enormous "weapon" against us, one capable of causing massive casualties and wreaking havoc on future military operations. This possibility has captured the attention of some of the highest officials in the Department of Defense (DOD), and the Army has been studying the problem since the end of Operation Desert Storm.

A detailed analysis conducted by the Army Materiel Systems Analysis Activity, the Army Research Laboratory, and the Army Tank-automotive and Armaments Command (TACOM) confirmed that the U.S. munitions logistics system is severely vulnerable to disruption by enemy attack during the initial buildup in wartime operations. Munitions logistics nodes, such as seaports, airfields, and munitions storage areas, are large, difficult to hide, and difficult to protect. Their destruction, which an enemy could easily initiate by many means, could cripple our warfighting capability by causing extensive casualties, creating severe ammunition shortages, terminating the footholds gained by early-entry forces, and critically impacting operational planning and execution.

Munitions: A Key Target

Seaports, airfields, and munitions storage areas are key targets for enemy attack. In recent years, their vulnerability has been demonstrated by U.S. attacks on munitions storage sites in Bosnia-Herzegovina and by Israeli attacks on terrorist munitions storage sites in Lebanon. In wartime, large quantities of munitions create a visible, vulnerable, and highly attractive target. During Operation Desert Shield, the Army's 22d Support Command reported the continuous presence of 30,000 tons of munitions at the port of Al Jabayl, Saudi Arabia. The potential destruction radius of those vulnerable munitions supplies stretched for miles and jeopardized thousands of troops and key warfighting assets. The potential for a munitions disaster during the buildup was so obvious that it was highlighted by the CBS television news program *60 Minutes*.

Munitions storage areas are especially valuable targets. Because of sympathetic detonation reactions and firebrands, one relatively easy-to-inflict hostile act can initiate an explosive event or fire that can propagate quickly to other munitions stacks. The result could be the loss of an entire munitions storage area.

A review of historical data by the Army Research Laboratory shows that such catastrophes have occurred on numerous occasions throughout U.S. military history. After Desert Storm, for example, a heater fire in an artillery resupply vehicle at Camp Doha, Kuwait, led to an accident that nearly decimated an entire Army battalion and caused a $40-million loss. Over 150 vehicles were destroyed. In fact, the Army lost more tanks in that one incident than it had during the entire war against Iraq. Fifty-two soldiers were injured and three were killed while cleaning damaged, unexploded ordnance from the area. During the Vietnam War, at least three U.S. ammunition storage areas were destroyed by fires and secondary explosions between 1965 and 1969. Thirty-six people were killed, many more were injured, and tons of expensive munitions were destroyed.

Threats to Munitions Supplies

The threats to munitions logistics nodes are many. They range from relatively simple small arms, mortars, and terrorist devices to sophisticated long-range ballistic missiles and artillery projectiles. Because of their large physical size, munitions storage areas are difficult to defend, whether the threat is a Scud missile or a dedicated terrorist willing to sacrifice himself. During Operation Desert Shield, it was reported that a Scud missile narrowly missed the massive munitions supplies on

the pier in Al Jabayl and landed just yards away in the water. We may not be so lucky in the future as increasingly accurate ballistic missiles, enhanced with global positioning system (GPS) guidance technologies, proliferate in the hands of potential adversaries.

In addition to the risk of enemy-inflicted destruction, munitions also can be destroyed by accidents. Examples of this include the Camp Doha incident already discussed and the 1973 Roseville, California, railroad accident, in which 48 people were injured and $24 million worth of property was damaged. The Roseville accident was started by a fire in a bomb-filled boxcar. Over the next few hours, 18 boxcars exploded in succession.

One of the largest ammunition disasters occurred at the Port Chicago Naval Base in California in July 1944, as two transport vessels were loading ammunition. The explosion of 4,900 tons of munitions instantly killed 320 Navy personnel, injured 390, and completely destroyed the base, two ships, and the large loading pier. Even the small town of Port Chicago, located 1.5 miles away, was heavily damaged. Property damage was estimated at more than $12 million.

The destruction of a munitions storage area can lead quickly to munitions shortages, in part because of changes in how much the Department of Defense (DOD) stores. DOD now seeks to maintain smaller "just enough" quantities of munitions rather than accumulate large "just in case" quantities. The situation is exacerbated by dramatically reduced pre-positioned supplies and a significantly smaller stockpile. The operational plans of warfighting commanders in chief now rely on small supplies of "preferred" critical munitions. However, only limited quantities of these expensive munitions are available in the pre-positioned stockpile.

Compounding the problem, total Army munitions requirements decreased from 2,500,000 tons to 540,000 tons (a 78 percent decrease) from Program Objective Memorandum (POM) 92 to POM 97. In fact, the reduced U.S. military industrial base does not plan on resupplying the munitions stockpile until after a war is over.

Defense Department Awareness

The severity of the enemy threat to munitions supplies has been acknowledged by a number of sources. In May 1997, DOD, led by the Joint Staff and the U.S. Central Command, conducted an extensive Joint Ordnance Wargame (JORDWAR 97) at the Naval War College in Newport, Rhode Island. One of the major findings of the 200 participants was the importance of quickly clearing munitions from a seaport of debarkation to avoid the risk of an accidental or enemy-inflicted catastrophe. In his speech to the Munitions Executive Summit in September 1996, Dr. Paul Kaminski, the Deputy Undersecretary of Defense for Acquisition and Technology, stated, "As we move toward a lower number of high-value munitions, we are finding that we are incurring a greater vulnerability to the loss of a complete strike capability—either within theater or globally—through attack or an accident at a single storage site."

The issue also was acknowledged by the Army's Deputy Chief of Staff for Logistics, Lieutenant General John G. Coburn. In February 1997, he wrote in a memorandum to the Deputy Chief of Staff for Operations and Plans, "Considering that our munitions requirements calculations have resulted in a smaller stockpile of munitions on the battlefield, it is essential that the Army take the necessary steps to make reduced logistics losses a reality."

Solutions in the Works

In response to the potential showstopper of munitions vulnerability, the Army has taken several steps to reduce our risk. A cornerstone of these efforts is the establishment of a new research and development project with the strong support of the Army Materiel Command, the Army Deputy Chief of Staff for Logistics, and the Army Deputy Chief of Staff for Operations and Plans. This project, the Army Munitions Survivability and

☐ The use of strategic configured loads on palletized loading system flatracks will permit shipment of tailored munitions loads from the United States directly to users in the field with minimal reconfiguration in the theater.

Logistics Program, was developed jointly by the Combined Arms Support Command Directorate of Combat Developments for Ordnance at Fort Lee, Virginia, and the TACOM Armament Research, Development, and Engineering Center (TACOM-ARDEC) Army Defense Ammunition Logistics Activity at Picatinny Arsenal, New Jersey.

This program will develop insensitive munitions technologies and will investigate new concepts for protecting munitions, by preventing munitions from bottlenecking at logistics nodes so they are less exposed to enemy or terrorist action and by better protecting munitions supplies while they await delivery to combat forces.

Insensitive Munitions

The first component of the Army Munitions Survivability and Logistics Program is insensitive munitions. These are munitions that are resistant to unplanned stimuli such as bullets, fragments, shaped charge warheads, fires, and detonations from nearby munitions. Technologies to make munitions less sensitive include improved munitions packaging, less sensitive energetics, and limited redesign of munitions components. ["Energetics" refers to propellants and explosives. Munitions with "less sensitive energetics" are more stable and react less violently when subjected to unplanned stimuli.]

Improved munitions packaging can prevent sympathetic detonations and provide venting so that munitions do not explode when engulfed in fires. One advantage of better packaging is that it may be the most cost-effective approach to fixing the deficiencies of the existing munitions stockpile.

Less sensitive energetics can be substituted in bulk-filled projectiles, submunitions, propellant charges, and warheads to reduce the vulnerability of munitions. Munitions components also can be redesigned to include pressure vents, expulsion charges, and self-neutralizing fuzes.

A major advantage of insensitive munitions is that safety and survivability are "built in" the munition itself. This benefits the munition throughout its life cycle, whether it is in storage at a depot in Nevada, stacked on a battlefield in Saudi Arabia, carried on the bed of a truck in South Korea, or attached to the underside of an AH-64 Apache attack helicopter flying over Bosnia.

Ammo Provider

The second component of the Army Munitions Survivability and Logistics Program is called the Ammo Provider Program. This program will develop solutions to ensure that munitions supplies keep moving and that they are protected while stored on the battlefield. Equipment enhancements will increase the distribution velocity of munitions. They include technology to create strategically configured munitions loads in the continental United States that can be shipped directly to the foxhole with minimal reconfiguration in theater. The program also will increase distribution velocity by incorporating commercial efficiencies in transportation, materials-handling equipment, aircraft loading and unloading, and containers.

A survivable munitions storage area on the battlefield will be created by using rapid barricades, fire-blocking camouflage blankets, and smart computer software. These improvements will help soldiers construct survivable and more efficient munitions storage areas. They will be achieved by a TACOM-ARDEC technology program, the Army Munitions Survivability Science and Technology Objective. This project will develop technologies to prevent explosive propagation among munitions stacks. The application of these technologies will prevent an explosion from spreading to other stacks and will greatly minimize the effects of a terrorist action or accident.

In addition to providing greatly improved survivability and safety, there are many side benefits to these enhancements. They include a 60-percent reduction in the size of the munitions storage area footprint, improved logistics response time, seamless logistics operations, increased theater ammunition throughput, and a generally more responsive, flexible, and mobile munitions logistics resupply system.

As General George Patton observed, "It is the duty of the military to foresee and prepare against the worst possible eventuality." This is as true today as it was 50 years ago. As the Defense Department prepares for the future, it finds that the threats are not as clear as they were during the Cold War. As President Clinton noted, "Today, the threat to our security is not an enemy silo, but the briefcase or the car bomb of a terrorist." The Army is taking significant steps to prepare for all possibilities, including an enemy or terrorist attack on our own munitions supplies. After all, we must take steps now to ensure that U.S. munitions are used *by* us and not *against* us. **ALOG**

Robert A. Rossi is the associate for technology planning and integration in the Army Defense Ammunition Logistics Activity, Picatinny Arsenal, New Jersey. He holds a bachelor's degree in mechanical engineering from Fairleigh Dickinson University and master's degrees in mechanical engineering from Stevens Institute of Technology and in engineering management from Florida Institute of Technology.

Modernization of a Class IX Facility

by Captain Darrell Duckworth and La Marcus Keels

Facility upgrades at the 565th Quartermaster Company Main Warehouse at Fort Hood, Texas, have turned the corps storage site into a first-class operation.

The 565th Quartermaster Company's Main Warehouse at Fort Hood, Texas, is the largest class IX (repair parts) facility in the Army. Its mission is to receive, store, and issue class IX repair parts to 15 direct-support division and nondivision customers (supply support activities) and to ship interpost referrals to Fort Carson, Colorado. The 565th Quartermaster Company is an element of the 544th Maintenance Battalion, 64th Corps Support Group, 13th Corps Support Command, III Corps. One of the Army's nonstockage list activities, the 565th's Main Warehouse has over 16,000 bins, and its stocks on hand are valued at over $70 million. The facility processes over 11,000 materiel release orders (MRO's) and receives over 1,700 lines of class IX monthly. All of this activity might prompt one to ask, "How do they do it?"

Facility Upgrades

The 565th's high productivity rate is attributable to many facility upgrades that have occurred over the past year and a half. Until October 1996, more than 50 percent of the serviceable bulk items were stored outside in Yard 24, which is a bulk storage area for serviceable and unserviceable parts. These parts were subjected to rain, wind, and sun, and, in some cases, they lost their serviceability. In October 1996, V warehouse was completed and equipped with the Unicor stacking system, which meant that approximately 200 bulk items could

☐ **Until October 1996, more than half of the serviceable bulk items at the 565th's Main Warehouse were stored outside.**

be stored under cover. Construction of V warehouse was the beginning of many facility upgrades that would increase the soldiers' productivity and efficiency, thus saving III Corps time and money.

State-of-the-Art-Storage

The second upgrade was the tearing down of a temporary clamshell structure in preparation for two new warehouses, one to be built by the 62d Engineer Company and the other by contractors. R and T warehouses were completed in April 1997 and equipped with state-of-the-art Stanley Vidmar stacking systems. Each warehouse has 1,000 bins under cover that can accommodate 95 percent of the 565th's bulk serviceable items.

Unfortunately, the offices in the warehouses in Yard 24 are not equipped with water, heating, air conditioning, or fixed latrines. To alleviate some of the discomfort of the summer months, the 565th, along with the 544th Maintenance Battalion, contracted with Ozarka Water Company to provide bottled water for the soldiers who receive, store, and issue repair parts in Yard 24.

Other major system upgrades include the installation of conveyors in the receiving section and the addition of tables that were custom built by the unit's repair and upgrade section. The receiving section now can receive multipack boxes faster and more efficiently. Instead of laying the parts on the floor, the soldiers can place them on a table in front of their workstations while they enter the appropriate identifying information into the Standard Army Retail Supply System-Objective (SARSS-O). Then they can place the parts on the conveyors and send them to their respective warehouse put-away boxes.

A huge automation upgrade occurred in March 1997 when the 565th acquired four high-speed Intermec 4400 printers. These printers are much faster than the Lowery printers that were fielded with SARSS-O. The 565th can print MRO's and receipt parts much faster with the new printers.

Around-the-Clock-Service

The 565th provides a 24-hour, 7-days-a-week operation and on-call services on weekends and holidays. In the stock control section, which is the "heartbeat" of the mission, seven soldiers work three shifts to provide 24-hour services. Additionally, the receiving section is divided into two shifts that provide customer service until 2200.

To make up for personnel shortages, the 565th employs 30 civilian employees from two contractors. The Raytheon civilians, known by their red hats, pull and ship referrals. With their help, the warehouse has reduced its order and ship time (OST) from 14 days to 4 days. The 565th soldiers and the "red hats" run an interpost referral program with Fort Carson, which, in a 7-week period (July and August 1997), showed a daily cost avoidance of $31,000 for III Corps. Physically Challenged Services, Inc. (PCSI), is contracted to pull excess MRO's and assist with location surveys and inventories. PCSI personnel have helped reorganize the unserviceable yard, properly label and ship hazardous and radioactive parts, and identify repairable parts that have been labeled prematurely for shipment to the Defense Reutilization and Marketing Office (DRMO).

The volume of receipts and daily transactions processed by the 565th strains the SARSS-O hardware. The tower, which holds the stock record account and communicates with the four corps materiel management centers (CMMC's) through a modem, runs 24 hours a day, 7 days a week. Certain processes, such as closeouts and account balance file updates, can take from 4 to 8 hours, depending on the quantity of information that must be passed to the 4th CMMC. On 3 October 1997, the 565th acquired a new Pentium tower from the 13th Corps Support Command Combat Service Support Automation Management Office. Since then, there have been drastic improvements in the time it takes to run various processes. A closeout that took 4 1/2 hours on the old tower takes 1 1/2 hours on the Pentium tower. With the new tower, the 565th can provide better customer support, because the workstations that are used to receive customer turn-ins are not tied up nearly as long as in the past, leaving soldiers more time to research and process customer turn-ins.

III Corps Benefits

The III Corps commander, Lieutenant General Thomas A. Schwartz, knows how important the 565th Quartermaster Company is to the Corps cost avoidance mission and its war on excess. The first three quarters of Fiscal Year 1997 resulted in a $113.83 million cost avoidance for Fort Hood and III Corps. The extra money was used to remodel gymnasiums, barracks, and motorpools and for many post beautification projects. At the same time, the company paid out $170. million in credits and returned over $95 million to the wholesale system. These accomplishments caused General Schwartz to commit to some short- and long-term facility upgrades at the 565th Main Warehouse. These facility upgrades will mean better customer support in a more efficient work environment.

Phase I of the short-term improvements will cost approximately $200,000 and include stadium lighting for Yard 24 so bulk items can be received after dark. Yard 25 will be paved, and a fixed latrine and utilities will be installed.

Phase II will cost approximately $400,000. Overhead bay doors, ventilation fans, and louvers will be installed in the warehouses of Yard 24, and the remaining three sides of Building 4924 will be enclosed to protect

☐ The 565th Main Warehouse has over 16,000 bins, and its stocks on hand are valued at over $70 million. Facility upgrades over the last 3 years have allowed serviceable stocks to be moved indoors at the bulk storage area, preventing parts from losing their serviceability.

serviceable parts from wind and rain. Phase III of the short-term improvements will cost approximately $200,000 and involve replacing the walls of existing warehouses and installing new roofs.

The long-term improvements will replace the existing wooden building with a new facility for receiving, shipping, and additional storage. This modern 32,000-square-foot warehouse will cost approximately $4.5 million.

Soldier Benefits

Soldier incentive programs in the 565th Quartermaster Company include recognition for best warehouse, best warehouse person, and many other simple performance and morale boosters. Water coolers have been placed throughout the warehouses and bulk storage yard. The unit is buying lower-back support belts for soldiers who must lift heavy cartons and equipment. The battalion also has provided the unit with many pride and safety signs to hang throughout the warehouses. Other internal warehouse improvements include a customer vehicle waiting area and flexible working hours to accommodate customers more easily.

There is now more lighting and space throughout the warehouses, so the company can make better use of its storage space. The storage area has been reorganized and now has alphabetical warehouses that provide a logical flow of parts in and out of the facility, and special sections for hazardous materials, sensitive items, and unidentifiable items. The unidentifiable section has returned over $600,000 worth of parts to the supply system.

The warehouse also has incorporated a reparable exchange program into its operation. Parts such as circuit cards and line-replaceable units are repaired and returned to the supply system at Fort Hood as opposed to being passed to the DRMO or the wholesale system. This resulted in another cost avoidance for the corps. The warehouse goal is to print, pull, package, and ship every referral the same day. The 565th has made this goal a reality.

The shipping section now has signs that identify customer pickup lanes and also has incorporated the Fedex Powership interpost referral program. This program saved over $1 million for the corps in its first 3 weeks of operation. The bulk storage area (Yard 24) continues to move serviceable stocks under cover to prevent parts from losing their serviceability. The unit is looking at inexpensive new walls for other areas located in Yard 24 to provide a better working atmosphere for their soldiers.

After an extensive rewarehousing and reengineering effort, the 565th Quartermaster Company has turned the corps storage site into a first-class operation. The company has mastered the basic fundamentals of supply and has taken it to another level. The 565th takes great pride in being the largest class IX facility in the world operated by soldiers who "Support the Force." **ALOG**

Captain Darrell Duckworth commands the 565th Quartermaster Company, Fort Hood, Texas. He has a bachelor's degree in criminal justice from Mississippi Valley State University and has attended the Chemical Officer Basic and Quartermaster Officer Advanced Courses and the Combined Arms and Services Staff School.

La Marcus Keels is a manufacturing supervisor with the Powertrain Division of General Motors Corporation in Warren, Michigan. When he co-authored this article, he was the accountable officer of the 565th Quartermaster Company Main Warehouse, Fort Hood, Texas. He has a bachelor's degree in systems engineering from the U.S. Military Academy.

Arming the Force on the 21st-Century Battlefield

by Captain James O. Winbush, Jr.

Logistics systems supporting both Force XXI and the Army After Next (AAN) are focusing primarily on providing the warfighter the right support at the right time and place as quickly as possible. The Ordnance Corps' answer to this challenge is a more flexible ammunition distribution system that provides asset visibility throughout the entire pipeline, from manufacturer to foxhole. This distribution system, called Ammo XXI, provides greater velocity and increased flexibility to meet the requirements of all future operations, including force projection, peacekeeping, humanitarian assistance, and aid to civil authorities.

The Army currently operates under the Maneuver-Oriented Ammunition Distribution System-Palletized Loading System (MOADS–PLS). To meet the Force XXI combat commanders' needs and establish an expandable theater distribution system, the Army must transition from conventional general-support (GS) and direct-support (DS) ammunition companies to modular ammunition companies. Under the Ammo XXI concept, the makeup of each ammunition company will be based on mission, enemy, terrain, troops, and time available (METT-T). For example, depending on the size and complexity of the mission, ammunition companies will be composed of a headquarters platoon and two to five heavy- or medium-lift platoons. Heavy- and medium-lift platoons also will be capable of operating independent of the headquarters element, which will allow maximum flexibility for tailoring the support structure to meet the combat mission.

Modular Ammunition Platoons

The modular ammunition company will have a headquarters platoon of 30 soldiers and 2 to 5 ammunition platoons. The headquarters platoon will provide basic logistics, administrative, and command and control functions for the company. The company normally will function as part of a corps support battalion (CSB) or a corps support group (CSG) and receive additional logistics and administrative support from its parent unit.

The heavy-lift platoon, which consists of 52 soldiers, operates at the port of debarkation, the theater storage area (TSA), or the corps storage area (CSA). Its materials-handling equipment (MHE) includes three rough-terrain container cranes; four 6,000-pound, variable-reach, rough-terrain forklifts; two 10,000-pound, rough-terrain forklifts; and three PLS trucks with trailers. The heavy-lift platoon can handle both breakbulk and containerized ammunition shipments. More specifically, it can stuff and unstuff 20-foot international standards organization (ISO) containers, which are the primary means of shipping ammunition into the theater. When not assigned as part of an ammunition company, heavy-lift platoons have a direct command and control relationship with a CSB or a CSG.

Medium-lift platoons operate primarily in the division rear at the ammunition supply point (ASP); however, they also can be found at the TSA and the CSA. The medium-lift platoon consists of 48 soldiers, and its MHE includes six 6,000-pound, variable-reach, rough-terrain forklifts; two 10,000-pound, rough-terrain forklifts; and three PLS trucks with trailers. Because it does not have cranes, this platoon cannot handle containerized ammunition shipments. However, it can handle breakbulk and preconfigured ammunition loads.

In addition to its mission at the ASP, CSA, or TSA, each medium-lift platoon provides personnel needed to run an ammunition transfer point (ATP). Each platoon has an ATP section that consists of 4 soldiers; a 6,000-pound, variable-reach, rough-terrain forklift; and a PLS truck with trailer. ATP personnel from three medium-lift platoons comprise the rear ATP, for a total of 12 personnel and 6 pieces of MHE, making the rear ATP capable of 24-hour operations.

Current Versus Future Ammunition Doctrine

Current ammunition doctrine states that combat-configured loads (CCL's) will be built by ammunition units in theater at the CSA and shipped forward using PLS trucks and trailers. To meet the future operational re-

quirements of Force XXI, the Ammo XXI concept proposes that these CCL's, which will be renamed strategic-configured loads (SCL's), be built at depots in the continental United States (CONUS) and shipped in 20-foot ISO containers to the theater of operations. SCL's will move directly from the depot to the weapon system or will be reconfigured into mission-configured loads (MCL's) once they are in the theater. MCL's will be built from SCL's or from breakbulk ammunition that arrives in the theater to support specific missions based on METT-T. In Ammo XXI, the doctrinal flow of ammunition on the battlefield remains unchanged from MOADS–PLS.

Sustainment requirements will flow from the theater of operations to the depot and the industrial production base under the Ammo XXI concept. Ammunition that is preconfigured in weapon system loads will flow to the user through a rapidly moving distribution system.

Battlefield Distribution

Transportation enhancements will play a key role in enabling modular ammunition units to provide responsive and flexible support to combat units. Since there are no cranes forward of the CSA, the Ammo XXI concept has containers going no farther forward than the CSA. At that point, all containers will be unstuffed and the ammunition stored or shipped forward for issue or storage. PLS flatracks will facilitate most of the ammunition shipments to the forward areas. In addition, container roll-in/roll-out platforms (CROP)—the latest flatrack design—will enable SCL's to be removed directly from containers by PLS trucks. This will save time and reduce the quantity of MHE needed to unstuff containers.

Increasing the velocity at which ammunition moves forward on the battlefield also will increase its survivability. The reduced quantity of ammunition in the theater will require better survivability for critical high-dollar munitions. A formal integrated concept team (ICT) is being chartered by the Army Training and Doctrine Command to review the full spectrum of munitions survivability. The ICT will address survivability issues from the depot to the user and the retrograde of munitions. Materiel solutions, such as the ballistic protective system, which is a modular Kevlar cover system, are being developed to enhance survivability of high-dollar munitions during transportation.

The forward ATP's will be run by the forward support battalion's (FSB's) ATP section. Under Ammo XXI, the forward support company (FSC), a part of the FSB, will pick up ammunition from the ATP in preconfigured loads and deliver it to the user. The Army's Force XXI concept reorganization proposal for the division support command (DISCOM) creates three forward support companies per FSB. Each FSC will have a distribution section that delivers supplies, including ammunition, to its supported combat units. This represents a change from the supply point distribution system in use today.

Ammunition Management Information Systems

Major changes in standard Army management information systems to support Ammo XXI resupply operations are underway. Currently, the Army is fielding the Standard Army Ammunition System-Modified (SAAS–MOD) in the Pacific theater. SAAS–MOD provides stock record accounting and receipt, storage, and issue at each ammunition support activity (TSA, CSA, ASP, and ATP). Fielding SAAS–MOD to the ATP provides automated supply procedures at that level for the first time. SAAS–MOD also provides ammunition management data to the corps materiel management center and the division ammunition officer.

The Unit Level Logistics System-S4 currently is being developed to provide automated request and issue procedures for ammunition at the unit level. Also, as part of the Army digitization effort, technology is being developed to provide on-board automated recording and reporting of ammunition expenditures of major weapon systems. These efforts will automate request procedures from the weapon system to the ammunition support activity and provide asset visibility from the foxhole to the depot.

The Ordnance Corps' vision of support of the Army of the 21st century requires a more responsive and efficient munitions logistics distribution system. Leveraging logistics information and the latest industrial technology will enable reduced numbers of ordnance soldiers to provide seamless ammunition support in any contingency. The modular units of the Ammo XXI concept will give commanders flexibility to tailor ammunition support packages to meet mission requirements without committing unnecessary resources. **ALOG**

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Materiel Fielding Standardization

by Jack D. Scott

Total Package Fielding (TPF) is the Army's standard process for fielding new weapons, equipment, and other materiel systems. The Army began using TPF on a test basis in 1984 and made it the standard fielding process in 1987. TPF is designed to ensure thorough planning and coordination among the combat developers and the trainers, the materiel developers and the fielding commands, and the gaining major Army commands (MACOM's) and the using units involved in the fielding of new materiel systems.

The Army uses the TPF process to ensure that fully supportable materiel systems and their required support are provided to using units with minimal disruption of the unit's day-to-day missions. TPF minimizes the work load associated with the fielding of new systems and equipment by requiring the materiel developer and the fielding command to determine all requirements up front; fund and requisition nearly all needed items; consolidate support items into unit-level packages; and coordinate the distribution of the major system, its associated support items of equipment (ASIOE), and support packages to a central staging site or to the gaining unit itself.

Regulatory Guidance for TPF

The official regulatory guidance for TPF is found in AR 700-142, Materiel Release, Fielding, and Transfer, which assigns responsibilities and prescribes the policies governing the TPF process. In addition, DA Pamphlet 700-142, Instructions for Materiel Release, Fielding, and Transfer, explains the policies and procedures used in TPF.

Requirements Determination

The identification of TPF package contents for a particular fielding is known as "requirements determination," and the result is establishment of the materiel requirements list (MRL). The range and quantity of support items in any TPF are determined not only by the complexity of the system being fielded but also by the structure of the gaining units involved in the fielding. It is the responsibility of the materiel developer and the fielding command to identify everything that is needed for using and supporting the new system and to coordinate those requirements with the combat developer and trainers and the gaining MACOM's.

The total fielding requirements are documented, coordinated, and agreed on through the memorandum of notification (MON) and materiel fielding plan (MFP), the mission support plan (MSP), and the materiel fielding agreement (MFA). The MON notifies the gaining command of the intention to field the new system. It usually is accompanied by a draft MFP that describes the system and the concept of support, provides details on all elements of support, and outlines the responsibilities of both the gaining and fielding commands. The gaining command responds with comments on the accuracy and completeness of the MFP and provides an MSP describing its support structure and identifying its planned support units.

Using the MSP, MFP, and applicable authorization documents, the fielding command prepares a consolidated MRL and, when necessary, conducts an MRL coordination meeting. An MRL package is sent to the gaining command approximately 240 days before the first unit equipped date (FUED).

MRL Coordination Process

MRL coordination can be accomplished through message, letter, or telephone conversation for a noncomplex system. Complex systems require more coordination.

Thirty days after the MRL coordination package is sent to the gaining command, the fielding command meets with representatives of each gaining unit to verify their specific requirements; this is approximately 210 days before the FUED. Based on the complexity of the system being fielded, this meeting may include a new materiel introductory briefing team, which may be composed of the materiel fielding team chief, one or more new equipment training (NET) instructors, and various technical experts.

When an end item is needed to support the fielding but, according to the Department of the Army Master Priority List (DAMPL), will not be available, the fielding command requests an out-of-DAMPL release from Headquarters, Department of the Army (HQDA). If the out-of-DAMPL release is denied and no assets are avail-

able for redistribution to fill the requirement, the fielding command notifies the gaining command; together, they decide if a delay in receiving the nonavailable items will force a corresponding delay in the fielding of the equipment.

The gaining command's role in requirements determination is essential. To ensure that a TPF is accurate, complete, and effective, the gaining command normally will—

- Provide points of contact responsible for coordinating and reviewing the total fielding requirements and the MRL package.
- Identify the modification table of organization and equipment or table of distribution and allowances that will be effective at the time of fielding.
- Complete an MSP, identify the using and supporting units, and indicate any unique support considerations.
- Participate in the MRL coordination as appropriate. This includes verifying the unit identification code and Department of Defense activity address code (DODAAC) of each unit involved, as well as verifying the automated supply systems supporting each unit. MRL coordination also includes reviewing the MRL package to identify any items not needed because they are already on hand in sufficient quantities.
- Finalize procedures for redistributing assets being replaced by the new fielding.
- Finalize the staging, handoff, and NET schedules and locations with the fielding command.

Staging for TPF

Unit materiel fielding points (UMFP's) and staging sites play a key role in TPF. The Defense Logistics Agency (DLA) now operates three UMFP's that support the Army. They are located at Defense Distribution Depot Susquehanna, Pennsylvania; Defense Distribution Depot Red River, Texas; and Defense Distribution Depot San Joaquin, California. These three DLA UMFP's are the sites where initial issue items are consolidated to support TPF worldwide.

The staging site is the facility or location where the total package comes together. It is usually at the staging site that all end items, support equipment, and packages of initial-issue spare and repair parts are prepared for handoff to the gaining units. To support the TPF process outside of the continental United States (OCONUS), the Army Materiel Command operates a number of central staging sites in Europe and two in Korea.

Joint Supportability Assessment

The joint supportability assessment (JSA) leads to the TPF package being called forward and its shipment to the staging site. Before shipping any TPF packages, the fielding and gaining commands coordinate and agree on the final fielding and handoff schedule. The JSA is a detailed assessment that identifies all shortages of equipment and support items and any deficiencies that would impact the operation, maintenance, or support of the system.

☐ **The staging site is the location where the total package comes together. All end items, support equipment, and packages of initial-issue spare and repair parts are prepared for handoff to the gaining units.**

The JSA takes place approximately 90 days before the projected FUED for OCONUS fielding and 60 days before fielding to a unit in CONUS. If all materiel; personnel; training; test, measurement, and diagnostic equipment (TMDE); special tools and test equipment (STTE); facilities; and publications are deemed adequate to support the fielding, the UMFP is instructed to ship the support packages to the staging site or handoff point, where they are joined with the system and ASIOE in preparation for handoff to the gaining units.

Deprocessing

Deprocessing ensures that systems are complete and ready to go. The fielding command will ensure that those items requiring deprocessing are inspected and made fully operational before handoff to the gaining units. Some items will need to be calibrated by the supporting TMDE support group, while others will need materiel fielding team or contractor personnel to prepare them for handoff. The fielding command determines and provides for, or negotiates for, all personnel, skills, facilities, equipment, tools, and materiel needed for deprocessing.

Joint Inventory

A joint inventory is conducted to ensure that all needed items are either received or placed on a shortage list for later delivery. Representatives of the gaining command participate in a joint inventory of the TPF package at the handoff site. The date for this inventory is coordinated between the fielding and gaining commands; the central staging area also needs to concur if it is to be used as the inventory and handoff site. Property book officers from the gaining units inventory the end items to ensure that all components and basic issue items are included. All class IX items (repair parts), TMDE, STTE, special mission kits, and publications are counted before being signed for.

Publications

A starter set of publications is provided by the fielding command. This starter set consists of two copies of each publication that applies to the using or support unit's authorized level of repair. These publications are in addition to any distributed by the Army Publishing Agency, and they ensure that complete publications coverage is included as part of the TPF. A noncomplex system may include just a commercial owner's manual. A complex system could include the following publications—

- Operator's manual and crew checklist.
- Lubrication order.
- Supply catalog and repair parts and special tools list.
- Hand receipt.
- Technical manuals in the -10, -20, -30, and -40 or -12, -24, and -34 series.

Users still need to submit publication requisitions. The primary method by which users obtain DA publications, including the initial issue quantity for new systems, is through the Army Publishing Agency using the DA 12-series forms. Publication requisitions can be submitted via e-mail, and a status is automatically provided.

☐ During deprocessing, the fielding command ensures that items are inspected and made fully operational before handoff to the gaining units.

No TPF would be complete without the needed technical manuals being on hand. The Army is moving swiftly toward the 21st century in the technical publications arena. Interactive electronic technical manuals are being developed. When they are adopted, instead of tons of paper manuals, units will receive computer diskettes or CD-ROM's containing all the information and procedures needed to operate, maintain, and repair their systems.

Transportation

Transportation coordination is the lifeline of TPF. Myriad support items are shipped from different sources to the UMFP's to be consolidated into DODAAC-level packages, and various end items are shipped from other sources at different times to be married up with the support packages at a staging or handoff site. All modes of transportation are used in TPF, but generally, when planning allows, the most cost-effective means are used; premium modes of transportation can be used to add flexibility to accommodate tight schedules.

Overseas, the gaining units arrange transportation for the materiel from the staging or handoff site back to their unit locations. The fielding command sends a release message when the packages are shipped, giving the transportation control number and Government bill of lading numbers for each shipment. With that information, the gaining command and staging sites can track the shipments through the Logistics Intelligence File. Receipt and transportation of all classes of supply from OCONUS ports of entry to the Army Materiel Command's staging areas follow standard transportation procedures.

The Army's 21st-century transportation capabilities will feature improved equipment, communications, and in-transit visibility. Today, the Army is acquiring improved containers, materials-handling equipment, and large roll-on-roll-off ships. To keep track of the large quantities of in-transit and pre-positioned supplies, the Army will rely on automatic tracking. The containers will transmit radio signals indicating their contents, location, and destination. All of the improvements being introduced to make the Army a more effective rapid deployment force also will improve the effectiveness and efficiency of TPF.

Customer Documentation

The fielding command provides a tailored customer documentation package to each gaining unit. This package is provided at the time of handoff, and it allows the unit to establish property accountability and post a receipt for TPF materiel. The transactions documented in the package are tailored to the specific supply system in use at the unit. Processing instructions are provided with each package, and personal assistance may be available when requested. The fielding command also provides a shortage list and the documentation needed to establish a due-in for all items not provided in the handoff.

☐ The fielding command provides a tailored customer documentation package to each gaining unit at the time of handoff, which allows the unit to establish property accountability and post a receipt for TPF materiel.

Each unit can choose among three media for receiving their documentation package: hard copy, magnetic tape, or floppy disk. With the fast pace of change in computers and communications, these media may become obsolete in the 21st century just as computer punchcards have become obsolete in the 1990's.

Conclusion

Logistics changes are helping the Army prepare for the challenges and missions of the 21st century. Many of these changes will apply directly to TPF. Improved equipment, communications, automation, and transportation will continue to keep the Army the best equipped and supported force in the world. The Army Materiel Command is dedicated to continuous improvement in the materiel and services it provides for our soldiers. Every soldier should know that there are thousands of professionals working behind the scenes ready to improve the equipment and logistics support he needs.

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Portions of this article were extracted from LOGSA [Logistics Support Activity] Pamphlet 700-3, Total Package Fielding, and AR 700-142, Materiel Release, Fielding, and Transfer.

Integrating Nondivisional CSS Unit Attachments

by Captain Miguel A. Martinez

The author offers divisional combat service support unit commanders tips to help them prepare for deployment with attached units.

You have completed all required leader, individual, and collective training. Your soldiers' training records have been reviewed, and soldier readiness packets are ready for a deployment. All driver's licenses and Department of the Army Forms 348, Equipment Operator's Qualification Record, are validated, and additional night-driving training has been safely executed to standard. Satisfied that you know the individual qualifications of the soldiers in your unit, you are ready for deployment.

You are eager to go to the area of operations to link up with your unit's attachments. You want to integrate the attachments into your unit quickly so you will be ready to carry out your mission.

Soon after arriving in the area of operations, you see that the newly added personnel are not integrating easily, and you wonder why. After all, you coordinated telephonically with the soldiers' parent unit and provided clear guidance on deployment requirements. All kinds of thoughts now invade your mind. You, the gaining unit commander, now realize that you do not really know the training level of these soldiers. How disciplined are they? Can they accomplish the mission effectively?

This situation is not uncommon, especially in the combat service support (CSS) arena. Current CSS doctrine for echelons above division envisions integrating external attachments more often than at the divisional level. Corps support battalions normally contain an array of functional units tailored to support a specific mission package. Therefore, they continuously integrate external elements. It is at the division CSS level, however, that integrating attached units is most difficult. Division CSS units often find themselves welcoming nondivisional attachments during training deployments and other operational requirements. Complete integration of these elements into the unit's task organization is a lengthy process. Nevertheless, the unit must accomplish its mission quickly.

Preparing for Attachments

To maximize the effectiveness of his attachments, the unit commander must research the elements he will be gaining long before attachment day. This research should occur in three stages. During the first, the notification stage, the commander identifies his mission support requirements and requests external support packages.

The second stage, the coordination period, is perhaps the most critical. During this stage, the composition and mission of the attached units must be defined clearly. The gaining unit's battle staff must present all of its deployment requirements to the attachments' parent unit. After all coordination is complete, the deployment package is given to the gaining unit's commanding officer, who must ensure that the attachments meet all of the criteria for deployment readiness and mission accomplishment. This initial period of contact between the gaining commander and the attached units is extremely important, whether the attachments occur before unit deployment (highly desirable) or after arriving at the training center.

The gaining commander must know the training level of the attached units, especially when the attachments occur after unit deployment. Meeting deployment and training criteria cannot be just a "check the block." The soldiers' self-discipline and ability to accomplish the mission matter most, and these are the areas that cannot be added to any deployment checklist. The real effectiveness of these two areas surfaces only during actual mission execution and day-to-day operations.

Integration, the final stage, is easier said than done. It is seldom achieved before link-up or task organization. This stage is an ongoing process that can be considered complete only if the mission is a success.

Lessons Learned

The Task Force XXI Advanced Warfighting Experiment (AWE) at the National Training Center (NTC), Fort Irwin, California, in March 1997 and a brigade combat team rotation to the NTC in July 1997 provided op-

☐Participation in an Advanced Warfighting Experiment and a later brigade combat team rotation to the National Training Center provided the author insight into successful integration of nondivisional units.

portunities for exercising attachment integration. For both rotations, my unit, the supply company of the main support battalion, received attachments from the 13th Corps Support Command (COSCOM) at Fort Hood, Texas, and Fort Carson, Colorado. In both instances, the attachments were responsible for specific missions and were not merely augmentee soldiers.

The two separate events provided an excellent comparison of contrasting circumstances. In the March rotation, AWE COSCOM soldiers were attached to the supply company before deployment to the NTC with a clearly defined command relationship. The attached soldiers participated in task force lane training and were part of the deploying unit until its return from the AWE. The lane training and preparation for deployment gave the company commander the opportunity to assess the training level and discipline of the attached soldiers. At the same time, the attached units' leaders completely adapted themselves to the company's standards of discipline and mission support, which was the ideal situation. The combat power provided by the attached units significantly enhanced the supply company's ability to accomplish the mission.

The summer rotation was the complete opposite. Attachments were not integrated into the supply company until arrival at the NTC. The supply company commander did not have a training assessment on the attached elements and did not know their disciplines. Again, these two areas were extremely critical to mission success—more so because the attachments were going to be operating at a remote location. Although the company commander had integrated the attachments into his plan and intent, he had not seen the soldiers perform their duties in the field. Task organization delays and misunderstood guidance clearly affected execution of the mission. It was clear that the commander *must* know his soldiers before he can apply the full effect of the unit's combat power to the mission.

Some Helpful Hints

The gaining unit commander always must ensure that attachments are ready to assume their mission when they arrive in the area of operations. This is ultimately the commander's responsibility. Here are some helpful tips to assist the gaining company commander when preparing for attachment integration—

- Request a clearly defined command relationship before link-up (for example, attached versus operational control).
- Request an initial training assessment from the attachment's parent unit. Focus on soldier readiness, discipline, and morale.
- Establish good rapport with the attachment's company commander. Provide him with all deployment and training information.
- Review the performance and qualification records of the attached unit.
- Ensure that soldiers in the attached unit meet all mission criteria before deployment. Treat them as if they were already part of your unit.
- Contact the leaders of the attached unit to discuss your unit standards of discipline; send them a copy of your command philosophy.
- Become an expert in the attached unit's field, especially if it differs from your routine unit missions.

Remember these rules on integrating attachments into your unit, and you will be ready to carry out the mission successfully on your next deployment. **ALOG**

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How Does the Gulf War Measure Up?

by Lieutenant Colonel Christopher R. Paparone

The author evaluates our logistics performance in the Persian Gulf War using the 16 Principles of Logistics as a gauge.

In the Persian Gulf War, the XVIII Airborne Corps experienced the full spectrum of logistics, from deployment in an austere contingency environment, through the painstaking development of a mature, 126,000-soldier corps, to participation in a theater logistics structure that combined U.S. and host nation support systems. During the war's ground offensive in February 1991, this support structure permitted the corps to maneuver over record distances and achieve operational and tactical objectives with great speed.

Looking back at the war, our logistics supremacy is clear. However, hindsight also allows us to measure our performance against time-tested tenets of logistics success: the 16 Principles of Logistics defined in the Army Strategic Logistic Systems Plan (which are derived from the principles described by Dr. James A. Huston in his historical study, *The Sinews of War: Army Logistics 1775-1953*). Using the 16 principles as our guide, I would like to share some observations my colleagues and I made while we served as staffers in the XVIII Airborne Corps during the Gulf War. The insights gained from this exercise may encourage logisticians to use the principles in planning and executing logistics support operations in future conflicts.

As a test of our logistics systems, the Gulf War ground offensive was very short. The real "logistics war" was fought during the 6 months of buildup that preceded the ground campaign. Our logistics offensive plans had to be executed several months before "G-Day;" preparations for Desert Storm had to be made during Desert Shield. For these reasons, I use the Principles of Logistics to look at our performance in a logistics continuum, without regard to the distinction often made between Operations Desert Shield and Desert Storm.

Equivalence

The United States took a deliberate risk, and violated the principle of equivalence, by deciding to deploy combat forces before building a satisfactory logistics support structure at either the corps or theater level. Our operational reach and our ability to conduct a mobile defense during the first 120 days after the President decided to send troops to Southwest Asia were hampered by our lack of combat service support (CSS) units and adequate supply stocks. More significant as a sign of the lack of equivalence, the XVIII Airborne Corps decided it was not prepared to mount an early, one-corps offensive, even when pressured by theater commanders to plan for such action.

This article expresses views of the author, not the Department of Defense or any of its agencies.

The late arrival of critical corps CSS units demonstrated that our initial defensive strategy was governed more by deterrence and deception than sustainability. To distribute the limited supplies of fuel, ammunition, and subsistence, the corps used the limited number of available host nation trucks and a system of supply point distribution. Distributing supplies was complicated by the simultaneous need to defend a huge area: the eastern portion of Saudi Arabia, where the corps area of operations was 175 kilometers wide and 300 kilometers deep.

However, the principle of equivalence was not ignored when planning for the Desert Storm offensive campaign began. By that time, logistics and tactical considerations were on an equal footing in developing maneuver options and determining the feasibility of each course of action. Great care was taken to ensure that the mix of CSS elements was in proportion to the rest of the corps. And logistics factors were weighed carefully by the corps and the Army Central Command (ARCENT) commanders when they selected the best alternative for the attack.

An important aspect of the equivalence principle is the need to maintain a comparable grade structure between logistics commands and other commands. Equivalence of rank is found at division level: the commander of a division support command (DISCOM) is a colonel—the same rank as the commander of the divisional maneuver brigade the DISCOM supports. In the Persian Gulf War, the 1st Corps Support Command (COSCOM)—then the largest major subordinate command of the XVIII Airborne Corps, with over 22,000 assigned or attached soldiers—was commanded by a full colonel. (Fortunately, the Army has since recognized that the complexity and importance of the COSCOM warrants a commander of brigadier general rank. I believe that a COSCOM commander actually should be a major general, equivalent to a division commander.) In contrast, the commander of the theater-level 22d Support Command (SUPCOM), Major General (later Lieutenant General) William Pagonis, held a rank more appropriate for the commander of a corps-sized unit.

Materiel Precedence

This principle was clearly violated. Many units arrived in country weeks before their equipment, and CSS equipment was deployed as the last priority at all levels. Most difficult to overcome were the distribution problems created by a lack of medium trucks to sustain the corps while it was dispersed in defensive sectors.

With few exceptions, XVIII Airborne Corps combat units were equipped by mid-February 1991 with the newest and best materiel available. This was due to Herculean, though last-minute, materiel fielding efforts. Many CSS units, however, went to war either short of their authorized equipment, at a low authorized level of organization, or without the latest available technology.

Use of pre-positioned cargo ships from Diego Garcia in the Indian Ocean was obviously a success story. These ships provided the first real sustainment package to the corps until shipments from the United States and Europe could be completed.

Forward Impetus

During its initial rapid deployment, with the exception of limited pre-positioned war reserves on the ships from Diego Garcia, the XVIII Airborne Corps received very little supply automatically pushed from wholesale depots. The "pull system" had to be employed in combination with pushes of preplanned sustainment supplies from the corps' home station accounts at Fort Bragg, North Carolina. The initial preplanned supply shipments (IPSS) mentioned in the corps' Southwest Asia war plans never materialized.

Automatic resupply of fuel, rations, and ammunition was planned for the ground offensive. That the ground campaign was brief (only 100 hours) was fortunate, because most of the bulk fuel and common-user land transportation (CULT) cargo trucks were sent forward with the attacking forces as "rolling warehouses." The corps' general support (GS) base was virtually absent and unable to provide timely follow-on resupply. Also, supported units were slow in returning trucks, which caused much nail biting in the logistics community. At one point, to compensate for the truck shortages, we resorted to sending Saudi Arabian commercial fuel trucks over the Iraqi border to build sustainment forward, at great potential political and physical risk to host nation assets and civilian personnel.

Mobility

Most of the medium truck companies deployed to Southwest Asia were equipped with M915 commercial-style tractor trucks and M872 40-foot semitrailers. Although these vehicles were appropriate for hard-surfaced roads, their inability to operate over land severely constrained the corps' ability to resupply ammunition as planned. This lack of cross-country-capable trucks forced tactical planners to clear the only hard-surfaced road in the corps sector (Main Supply Route Texas), which also was the road most heavily defended by the Iraqi forces.

To gain a cross-country capability, the 24th Infantry Division (Mechanized) elected to trade M932 tractors from supporting nondivisional POL (petroleum, oils, and lubricants) truck companies for vehicles capable of hauling M872 ammunition trailers over land. The division judged that not having sufficient fuel delivered forward

was a lesser risk than not having enough ammunition forward. For the duration of the 100-hour ground offensive, a reported thirty 5,000-gallon tanker semitrailers remained unemployed because of the lack of cross-country-capable prime movers.

We also had too few organic heavy equipment transporters (HET's) and lowboys to efficiently move the corps into position across long distances. The corps needed to make 1,508 moves with HET's and 721 with lowboys to shift from its defensive positions to offensive tactical assembly areas (TAA's), but it was equipped with less than 100 HET's and even fewer lowboys. Fortunately, host nation and allied forces pitched in to assist our efforts to move the corps. This made the desired timing of the ground attack feasible.

For the offensive, many divisional internal supplies and equipment had to be moved west by CULT trucks. This was less the case with the 101st Airborne Division (Air Assault) and more so with the 82d Airborne Division and the mechanized forces of the 24th Infantry Division and the 3d Armored Cavalry Regiment. For example, the 82d Airborne Division required over 500 tactical cargo trucks to motorize 3 brigades of infantry. These trucks were provided from theater and 1st COSCOM assets. (They were replaced by less mobile and less reliable commercial 5-ton-equivalent trucks. Interestingly, these replacements were mostly Mercedes trucks, which were colorfully painted and nicknamed "circus trucks.") The effect was to reduce the corps' ability to stockpile supplies inland and provide off-road-capable resupply during offensive operations.

Dispersion

Late in the XVIII Airborne Corps' preparation for defensive operations, several support areas were established with stocks of ammunition, fuel, water, and food. These areas were well dispersed and were placed logically to assume successive fallback positions if necessary.

In contrast, a degree of risk was accepted in placing large quantities of supplies forward in relatively small areas at unprotected corps and theater logistics bases to support offensive operations. The loss or denial of one of these log bases could have significantly impaired the offensive capability of ARCENT and Marine Central Command ground forces. Fortunately, our intelligence estimates correctly viewed enemy disruption of these bases as unlikely, especially in light of our overwhelming air superiority.

Economy

During the strategic deployment of the XVIII Airborne Corps, we found that our heaviest element, the 24th Infantry Division, closed in Saudi Arabia earlier than our lightest force, the 82d Airborne Division. This disparity occurred because the 24th Infantry Division made economical use of fast sealift, rather than piecemeal airlifting of its troops and equipment, and because the 82d Airborne Division had never planned on deploying by sea. We concluded that fast roll-on-roll-off ships were worth their weight in gold, but there weren't enough of them.

During defensive preparations, we observed that many units stockpiled supplies to the point of hoarding. When we shifted west to prepare for the offensive, units abandoned or destroyed supplies while still in their defensive positions because they lacked transportation to move them. Waste made for an uneconomical transition to offense. We specified that priority of movement went to building up stocks forward as the corps moved to offensive TAA's.

Arguably, we were not economical in using our limited number of CULT trucks when we started to move. Such a massive and rapid operational displacement of a large force had never been accomplished before; unfortunately, we did not make optimal use of our limited cargo-hauling capability. Three factors were primarily responsible for this failure—

- Unit cargoes were more than the minimum necessary to accomplish the mission. For example, units carried portable latrines and showers and containers of bottled, rather than bulk, water.
- Divisions were not as mobile as envisioned in doctrinal publications.
- We lacked the organization and long-distance communications needed to control the use of our CULT assets.

Feasibility

While we planned for defense and attempted to monitor the buildup of logistics assets and their employment, we lacked detailed logistics estimates at all levels. This deficiency was mostly due to the unknown disposition and arrival dates of major CSS units. By the time the 1st COSCOM closed in country, we already were planning and preparing detailed logistics estimates for the offensive campaign. As a result, estimates for the defense were neither fully completed nor properly documented in the XVIII Airborne Corps.

The logistics estimates prepared for the offensive campaign relied heavily upon the intelligence and operations estimates for obtaining realistic ammunition and fuel consumption forecasts, as well as data on capabilities and expected shortfalls in distribution. In most cases, ammunition and fuel consumption estimates were overstated, resulting in the commitment of too many corps assets to follow advancing maneuver elements. This error delayed sustaining resupply scheduled in support of future operations.

The corps' logistics estimates showed a potential

deficit of 100 bulk fuel tractor-trailers to support the depth of operations expected. The actual fuel distribution shortfall came close to that forecast. We concluded that our carrying capacity was sufficient, but that we probably misallocated tanker assets that were with maneuver units. If the war had been longer, the additional tankers would have been needed to reduce risks in achieving operational reach.

The Army needs a faster and more accurate method for developing logistics estimates. FM 101-10-1, Staff Officers' Field Manual—Organizational, Technical, and Logistical Data, does not provide data on time, distance, and consumption rates needed to develop realistic logistics requirements. Because of the lack of supply asset visibility—the result of a general ineffectiveness of logistics automated systems—we lacked current information needed for making supply and transportation estimates.

Flexibility

One of the XVIII Airborne Corps' greatest strengths was the support provided by Air Force intratheater air assets. We used C-130 transports to move thousands of soldiers, many tons of rolling stock, and repair parts in preparation for the offensive. During our displacement from defensive positions to offensive TAA's, 2,703 wheeled vehicles, 15,848 passengers, and 116 pallets were moved into place in just 14 days. In addition, we received outstanding aerial bulk fuel delivery service, which gave the corps significant operational flexibility.

Each day, the Air Force delivered from 100,000 to more than 120,000 gallons of fuel to Log Base Charlie, using a field landing strip constructed from a two-lane paved road by Army engineers . This remarkable capability—enough to sustain the daily minimal combat operations of the 101st Airborne Division—would have shifted forward into Iraq if the war had lasted longer. Ironically, we learned too late that the 101st DISCOM did not have the proper equipment and trained personnel to extract fuel at a forward air strip. Only the 101st Corps Support Group had that capability, and they were still located in Saudi Arabia at Log Base Charlie.

We have noted already our lack of flexibility in moving GS support and cross-country-capable distribution assets. Such assets were needed to support the follow-on offensive exploitation and pursuit operations that were planned.

Relativity

Synchronizing logistics efforts at each level of support, from theater down to separate-brigade-sized units, was the single most difficult planning challenge. Written plans detailing the time and location of required support tasks had to be prepared and staffed at each level. Formal, documented plans were not available from echelons above corps (EAC). Most of our theater logistics plans were on Harvard Graphics slide presentations that changed from week to week. As a result, misunderstandings surfaced during the execution of SUPCOM commitments for transportation, fuel, and ammunition in support of the corps. Our corps commander had to go "toe-to-toe" with the SUPCOM commander more than once.

The corps faced the logistics challenges of planning and executing support for a major ground offensive while simultaneously conducting major materiel fieldings, supporting movement operations, securing logistics areas, maintaining aviation and wheeled assets, building and maintaining a usable road network, supporting multiple field landing strips and airports, and creating forward stocks of fuel (5.8 million gallons), ammunition (35,000 tons), and rations (more than 2 million meals and 1 million gallons of purified water). All in all, these activities were accomplished at the right time and place so the ground attack could proceed on schedule.

Continuity

A significant lack of continuity existed when the 1st COSCOM was put together in theater during the Desert Shield buildup. Peacetime command and control arrangements were inadequate to handle a force structure comprising a host of active and reserve component units from all over Forces Command. Most of these units had never trained or been associated with what were now their wartime higher headquarters until they arrived in country. It is understandable that the 1st COSCOM commanders and staff experienced great difficulty in directing an organization that grew to four times its peacetime size. The ad hoc nature of the corps' logistics organization led to numerous problems in standardizing standing operating procedures and in centrally managing critical assets.

Similar continuity problems arose with the ad hoc theater SUPCOM, later designated the 22d SUPCOM. This organization began as a small group of hand-picked officers from the continental United States (CONUS), augmented by soldiers from the U.S. Army Military Training Mission, Saudi Arabia. As time progressed, hundreds of soldiers flowed into Saudi Arabia from all over CONUS to form the improvised SUPCOM.

Although there were numerous examples of supply and maintenance training deficiencies that made the transition to war difficult, the most glaring problem was implementing procedures for organizational clothing and individual equipment (OCIE). Units traditionally obtained OCIE support from their installation central issue facilities, and they were ill-prepared to establish unit OCIE operations in the field.

Our ability to support mortuary affairs services was limited by the lack of trained personnel and equipment

available from both the active and reserve components. Although we processed only 21 remains, we felt we would have been unprepared to support the estimated 950 remains anticipated in corps plans.

Timeliness

There has been speculation that the United States could have forced Iraq from Kuwait earlier if we had possessed the increased strategic mobility needed to move our forces more rapidly into the theater. What we do know is that the 6 months we needed to move a two-corps army into position allowed Iraq the same amount of time to fortify its positions.

Shipments of desert camouflage uniforms (DCU's) and other desert individual clothing and equipment were not accomplished fast enough to keep pace with the buildup or to replace items lost through normal wear and tear. Many XVIII Airborne Corps soldiers went for months without more than two sets of DCU's. We observed that VII Corps troops never had enough DCU's during the offensive operation—most wore the green battle dress uniform.

Responsibility

We mistrusted the reporting of logistics status at all levels during both Desert Shield and Desert Storm. In fact, we suspected that some units distorted or misrepresented their logistics status on purpose in order to gain an advantage in the corps' allocation of scarce resources. The aberrant reporting probably stemmed from a lack of confidence in the supply system, which was instilled in units when they received neither corps nor EAC support in the first 120 days. Abuse of the high-priority designator system for supply requisitioning also indicated lack of confidence and discipline in the supply system.

Another aspect of fixing logistics responsibility is forming a well-developed logistics concept of operation and a list of tasks specified by phase of the operation. Logisticians must painstakingly cross walk these tasks with the other battlefield operating systems and ensure that vertical coordination is conducted with staff planners at both higher and lower levels. We found execution at lower levels of support was much better than implementation at higher levels, which we attributed to a lack of adherence to specified tasks at higher levels and an ability to perform implied tasks at lower levels.

We found that responsibility was better fixed at lower levels of command because of the performance-oriented nature of the organizations and the sound doctrine that they had practiced at the combat training centers. Higher level oral, as opposed to written, commitments for support were subject to misinterpretation and were limited to what those involved could remember.

Unity of Command

One of our most frustrating experiences involved the command and control of CULT truck assets during the XVIII Airborne Corps' displacement west. Emerging doctrine, practiced in Saudi Arabia and Iraq, calls for placing CULT trucks forward in corps support groups, while controlling their use from the corps movement control center (MCC). In effect, this doctrine calls for decentralized command and centralized control—not a very effective combination when attempting a large-scale operational maneuver.

Once they received mission taskings for trucks from the MCC, truck unit commanders could not control soldiers or equipment well because of the fragmentation of their organizations and the loss of unit integrity. Under the Army's old doctrine, which called for placing CULT trucks under a transportation brigade, better command and control can be maintained and better use can be made of limited transportation assets. This point was brought home when we observed how the French forces' HET's were employed as a company element rather than piecemeal. While making multiple trips, including moving XVIII Airborne Corps assets, the French HET unit never missed a scheduled pickup or experienced a breakdown.

Another insight gained from our large-scale movement was that the corps MCC probably should be a major subordinate command of the corps headquarters and not the COSCOM. The functions of the MCC overlap greatly with other battlefield operating systems, and setting priorities for using CULT assets and making road movements must be supervised from the corps command post to ensure unity of command. The MCC commander should wear two hats: commander, when in the movement control and traffic management business, and corps transportation officer, when in a policy and planning role. The concept is similar to that already employed by other battlefield operating systems, such as the corps engineer acting as commander of the engineer brigade, the corps surgeon commanding the medical brigade, and the corps fire support officer commanding the corps artillery.

Information

Good logistics results from good information. In the Gulf War, logisticians at all levels had to work very hard to communicate up and down the echelons of support. Fortunately, we were generally well supported by the signal community, which provided access to the multichannel and high-frequency systems we needed to pass logistics information at the division and support group levels.

The XVIII Airborne Corps required units to submit a daily logistics status report through materiel management center channels. The purpose of the report was

to provide each echelon of materiel management centers with the current status of supply, maintenance, transportation, and services at their supply support activities and direct support and GS units. The intent was that action would be taken at the appropriate level to correct deficiencies or assist units in obtaining required support. The report format was quite lengthy—the resulting corps compilation was 30 to 40 pages long—and we experienced erratic compliance. The overall system was unreliable and probably more of a bureaucratic nightmare than a useful tool.

The Army must develop a timely and reliable way to collect status information without creating a heavy burden on all concerned, as was the case in the Gulf. The method must be flexible enough to provide a varying scope of information that can be adjusted according to the tactical situation. For example, we needed less information during actual ground offensive operations than we did during the deployment and buildup of Desert Shield.

Related to the reporting problems was the inherent lack of compatible computer systems employed at materiel management centers. We constantly sought equipment density information, but because of property book variations, we had to use unreliable offline reporting. Requisitioning systems also varied, and older systems could not perform lateral searches for materiel or provide rollup data with the newer systems. The Standard Army Ammunition System was too slow to account for rapid issue of combat-configured loads (the same lesson learned from Operation Just Cause in Panama). Lack of dedicated communications data links contributed to the ineffectiveness of the automated systems.

Quality

The overall quality of the weapon systems, such as the AH-64 Apache attack helicopter, Patriot missile system, M1A1 Abrams tank, and M2/3 Bradley fighting vehicle, and the ammunition employed by the corps was excellent. There were few, if any, "white elephants" in the inventory. The employment of Army Materiel Command logistics assistance officers throughout the theater and corps was essential to the quality of our steady-state maintenance and materiel fielding efforts.

Simplicity

We found that our logistics system is far from simple. The reason is the multitude and complexity of the weapon systems being supported on the battlefield. The great array of support units and automated systems required to support a corps with both light and heavy divisions creates an almost untenable structure for support. We found few uncomplicated processes that supported units could use to obtain relief. Logistics staffs were unquestionably the busiest staff elements in the theater. Of all the battlefield operating systems, CSS planning and execution required the most elaborate staff supervision.

We learned that to keep things simple, logisticians must focus on the most critical supply and distribution aspects of combat logistics; namely, fuel, ammunition, rations, repair parts, and movement control. Once these activities are under control, others can be tackled. The list of logistics issues is never wholly resolved but merely rolls on, as one issue after another surfaces. Simplicity is achieved when logisticians find an effective means of prioritizing the issues confronting them and then concentrate on finding solutions.

Proud as we are of the logistics accomplishments of the Gulf War, an evaluation of our logistics planning and performance measured against the Principles of Logistics may allow us to make smart changes in anticipation of future conflicts. Two major conclusions may be derived from this analysis. First, had Iraq attacked early in our buildup, our lack of sustainment might have become the reason for our defeat. Balancing the flow of sustainment with the strategic deployment of combat power—in other words, equivalence—would have been the lesson learned in that case.

Second, had the ground war exceeded 100 hours, the XVIII Airborne Corps (and hence the coalition forces) would have needed an unplanned operational pause to allow logistics to catch up to the combat advance. The immediate problem would have been the cycle time for GS fuel haulers: they could not travel long distances, back and forth, fast enough to maintain the momentum of our attacking forces. In reflection, this was clearly a risk; only the shortness of the ground war made offensive logistics support "feasible." **ALOG**

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Supporting Special Operations Forces

by Major Mark A. Ferris

When the Special Forces, the Rangers, and other special operations forces take the field, they are supported by the Army's only two forward support companies.

Congratulations, you've been assigned to a forward support company. If you're ever fortunate enough to receive those orders, you won't have to wonder about your destination: you'll be coming to Fort Bragg, North Carolina, and the 528th Support Battalion (Special Operations) (Airborne). The Army currently has two forward support companies, and both are assigned to the 528th.

When you receive your notification, you will probably have many questions. What is a forward support company? What is its mission? Who does it support? How is the company employed? What are its capabilities? How does it train?

Mission and Employment

The mission of a forward support company (FSC) is to provide combat service support, limited level II combat health service, and limited engineer support to Army special operations forces (SOF) units worldwide and in any conflict. Specifically, the FSC's assigned to the 528th Support Battalion provide support to Army special forces units, the 75th Ranger Regiment, civil affairs and psychological operations units, and the 160th Special Operations Aviation Regiment.

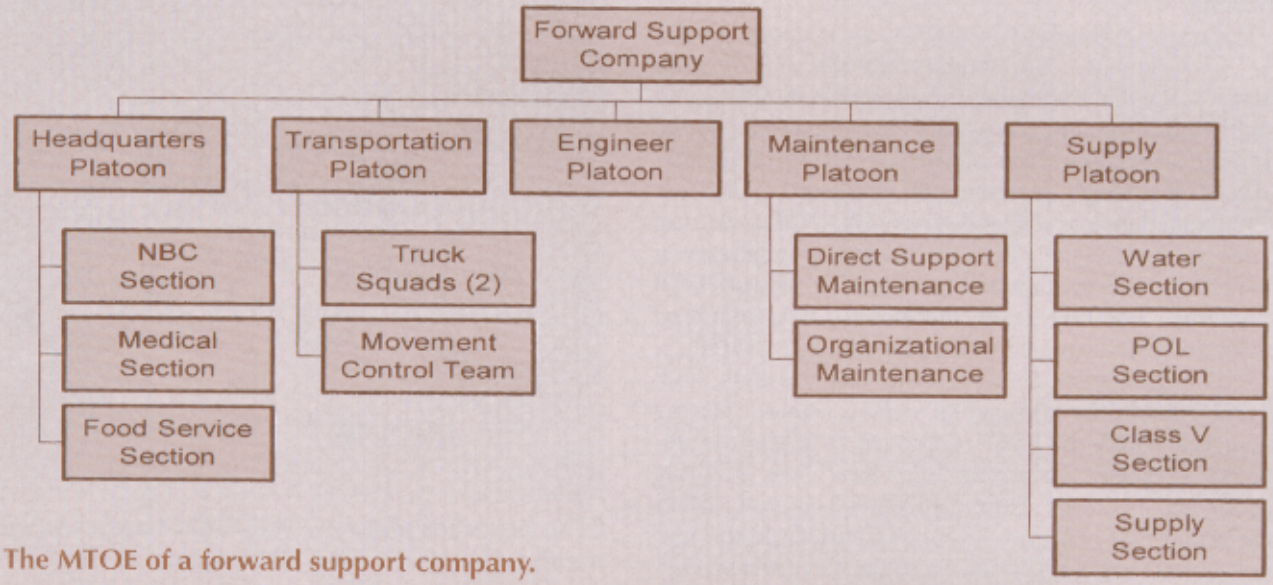
The multifunctional FSC's are rapidly deployable. Having two FSC's means SOF units can be supported in two major regional contingencies simultaneously. A deployed FSC may be directed to provide support for a joint special operations task force consisting not only of Army SOF units but also Navy Seals, the Air Force's Special Operations Wing, and Marine Corps assets.

FSC's also are employed to establish and operate an intermediate staging base (ISB) for SOF. The company is equipped with 5 MK19 machineguns, 8 .50-caliber machineguns, and 15 M249 squad automatic weapons, so it can provide force protection for itself and its sector of the ISB perimeter.

Organization and Capabilities

An FSC is commanded by a major and is authorized 133 soldiers. It is structured with capabilities similar to those of a divisional forward support battalion. As you

☐ **Soldiers of a forward support company board a C-130 transport for airdrop onto the Sicily drop zone at Fort Bragg.**



☐ The MTOE of a forward support company.

can see from the chart above, the FSC modification table of organization and equipment (MTOE) provides the unit with the capability to arm, fuel, fix, move, and sustain the force, as well as construct a base camp (thanks to its engineer platoon). With attachments from the battalion's headquarters and main support company, it can act independently without a higher headquarters.

Maintenance is provided to a supported unit by the direct support (DS) maintenance section. The DS shop has personnel skilled in automotive, special-purpose engineer, weapons maintenance, and allied trades. It also provides contact teams and equipment recovery support to SOF units.

The supply and services platoon provides class I (subsistence), III (petroleum, oils, and lubricants [POL]), V (ammunition), and water production and limited distribution to SOF units. The class I ration distribution section is capable of breaking down and distributing rations to the food service sections of various SOF units. The class III POL section can receive, store, and issue diesel, mogas, and JP8 fuels for ground operations; it also can conduct both hot and cold refuel operations in support of elements of the 160th Special Operations Aviation Regiment and Air Force special operations aircraft.

The class V ammunition section is capable of conducting ammunition transfer point operations. However, it normally will be given the mission of establishing an ammunition holding area for supported units. The water purification section produces water using two 600-gallon-per-hour reverse osmosis water purification units and distributes it through a forward area water point supply system. By using the purification unit, the section can provide potable water for small-unit operations.

The transportation platoon conducts short-haul operations for personnel and equipment. The platoon can operate at an ISB or provide support forward in the area of operations. It is configured with two truck squads that employ both 5-ton medium tactical vehicles and 5-ton tractors with both box trailers and low beds.

Another part of the transportation platoon is the movement control team (MCT). The MCT coordinates movements for the FSC and for SOF units, both those at home station and those forward deployed. It coordinates movement by all modes of transportation, including air, sea, rail, and road. The MCT also has the mission of managing the FSC's common-user land transportation assets. It coordinates movements of SOF units in a theater with the theater movement control center.

The engineer platoon's mission is to construct a base camp capable of sustaining SOF units in an austere environment and serving as an ISB from which operations can be launched. It is composed of combat engineers, masons, electrical repairers, generator mechanics, and supply personnel. They are capable of erecting a camp from the ground up or improving existing facilities, and they can provide the camp with electricity. Their secondary mission is to erect and fortify the base defense in support of the force protection (countermobility and survivability) plan.

The headquarters platoon provides command, control, and administrative support for the FSC. The medical section can establish an aid station and provide level I and limited level II care in an ISB. The platoon's food service section provides meals for the company; with augmentation from the battalion's headquarters and main support company, the section can provide food for an entire ISB.

Training

Training to standard is the key to success for the FSC's. Company commanders identify and develop clearly defined, measurable, and attainable standards and establish the systems necessary to meet those standards. Training is mission-essential task list (METL) and battle focused; it is tough, realistic, and challenging; and it is well planned, resourced, and rehearsed. With a mission to deploy rapidly, the FSC's place a strong emphasis on maintaining their equipment to technical manual 10/20 standards. Training at the individual, collective, and leader levels is designed to support the unit's METL.

FSC's deploy on numerous training missions, both in and outside the continental United States. During fiscal year 1997, the FSC's deployed in support of numerous exercises, including Joint Readiness Training Center and National Training Center rotations, Exercise Bright Star in Egypt, Exercise Cobra Gold in Thailand, and exercises in Florida, Georgia, Nevada, and Germany.

Improving FSC Capabilities

Plans have been finalized to change the 528th Support Battalion's organization to add a third FSC. The Army also plans to add an FSC and a main support company in the reserve components.

The beneficiaries of adding a third FSC to the battalion are the line troops and the line companies. Under the current battalion structure, operational tempo dictates that the FSC's are always in a two-cycle management system: either prime-time training or mission execution. In order to meet garrison support requirements, the FSC's must sacrifice either training or mission, and mission is never sacrificed. The third FSC will allow the battalion to shift to a three-cycle system. One company would be detailed to meet garrison support requirements; the second unit would conduct intensive, uninterrupted training before assuming the mission cycle; and the third company would be prepared for deployment on 18 hours' notice.

☐Forward support company soldiers establish a refuel site to support SOF aviation assets at an intermediate support base at the Joint Readiness Training Center at Fort Polk, Louisiana.

☐An engineer platoon establishes base camp during Exercise Bright Star '97 in Egypt.

Ground was broken in October 1997 for the new Special Operations Logistics Facility at Fort Bragg. This state-of-the-art facility will become the home of the 528th Support Battalion in December. It will include a new battalion headquarters, direct-support maintenance facilities, a supply support activity warehouse, and a parachute-rigging facility and will house all other organic assets of the unit.

The new barracks complex for the 528th opened in June. From these facilities, the battalion will be able to support and deploy combat service support assets anywhere in the world. The complex will assist in ensuring success on the battlefield for SOF.

The forward support company is a unique organization, from its MTOE to its mission. It offers a challenging, fast-paced assignment. If you want to work with hard-charging, dedicated professionals, don't wait for your branch to assign you to the 528th Support Battalion; call and request assignment to this unique organization in today's Army. For more information on the 528th Support Battalion, contact the battalion adjutant at DSN 239-9886 or -8157 or e-mail ferrism@soc.mil.

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A Guide for the Ground Assault Convoy: A Combined Arms Approach

by First Lieutenant Bradley L. Rees

The author presents the ground assault convoy as an example of how combat, combat support, and combat service support units can work together as a team.

Combined arms training is needed more today than ever. With the number of peacekeeping and force-protection missions on the rise, it is essential that combat, combat support, and combat service support units train together as a team. The old adage, "Train as you fight," says it all.

Having had the opportunity to serve in both an infantry battalion and a multifunctional corps support battalion, I have found that units want to train together as a combined arms team, but seldom do so because of conflicting training schedules or deployments. To fight effectively and win on today's battlefield, all units must receive combined arms training. One mission that demonstrates the need for combined arms cooperation is the ground assault convoy (GAC), or convoy escort.

Several combat service support (CSS) units conduct the GAC mission independent of military police (MP) or infantry units because it is one of their mission-essential tasks. Although the GAC is conducted to Army Training and Evaluation Plan (ARTEP) standards, incorporating combined arms assets, especially infantry units, would increase greatly the combat multipliers on the battlefield and add to the chances of mission success. The addition of infantry assets to the GAC also would introduce the CSS soldier to different tactics, techniques, and procedures (TTP's) that would ensure greater survivability in combat.

In this article, I will discuss the TTP's of the GAC from an infantry point of view. It is not my intent to discourage CSS units from incorporating these TTP's into their own training plans. Instead, I hope this article will serve as a guide for the development of TTP's for both infantry and CSS units, thereby ensuring better combined arms training in the future.

Increased Use of Anti-Armor GAC's

The addition of the GAC to the mission-essential task lists (METL's) of many light, airborne, and air assault anti-armor companies reflects the needs of the Army today, even though ARTEP 7-91-MTP, Anti-armor Company, does not discuss convoy escorts. Anti-armor companies perform the GAC mission more today because of increased real-world peacekeeping and force-protection missions. The addition of the .50-caliber M2 machinegun and the MK19 automatic machinegun to the anti-armor table of organization and equipment also contributes to the increased use of the anti-armor GAC. Individual infantry battalions can perform security for their convoys and for vehicle movements of CSS units operating in the division area, and infantry battalions can maneuver near the forward line of own troops without relying on support from MP escort teams.

The increasing mobility of today's Army and the rapidly changing face of the modern battlefield increase demands for protection of supplies and sensitive cargoes in transit. The GAC routinely escorts convoys transporting key personnel (especially between tactical operations centers and brigade support areas [BSA's]), and such cargoes as ammunition and special equipment and supplies required by the maneuver commander. In the past, the units' locations on the battlefield and the availability of slice elements limited the use of convoy escorts. The anti-armor GAC eliminates these drawbacks. The security of the escort depends on the anti-armor element assigned to the area of operations. The anti-armor GAC provides 360-degree security during the entire convoy.

The success of the GAC depends on the preparations for and rehearsals of the actions that both the GAC element and the escorted vehicles would take in the event of enemy contact, especially near and far ambushes, the receipt of indirect fire, and obstacle breaching in stride.

GAC Composition

The number of vehicles required for a GAC differs based on mission, enemy, terrain, troops, and time avail-

able (METT-T) and the size of the escort. However, the basic organization of the anti-armor GAC remains constant. Each element of the GAC has one vehicle but can request more if needed. The escorted vehicles are equipped with their own weapon systems. When available, air defense artillery (ADA) assets, infantry troops from the BSA security force or battalion reserve, and a scout section can augment a GAC. The ADA protects the GAC from enemy aircraft, while the infantry eliminates any enemy dismounts or a breach in stride.

The anti-armor section is the smallest element in an anti-armor company with the ability to perform a GAC. One M966 tube-launched, optically tracked, wire-guided (TOW) carrier travels in front of one to three vehicles as the lead element, while the other TOW carrier follows as the trail element. The platoon leader or the platoon sergeant follows behind the last escorted vehicle and controls the entire GAC.

Platoon GAC's escort four to nine vehicles. The placement of the escorted vehicles ultimately depends on METT-T, observation, avenues of approach, key terrain, obstacles, concealment, and the platoon leader's discretion. Organic platoons with attached anti-armor sections make up the team GAC. Team GAC's escort convoys of at least 6 but not more than 15 vehicles. One section from the organic platoon acts as the scout for the GAC, while the other section and the platoon leader make up the lead element. The platoon sergeant of the organic platoon and the attached section make up the trail element. In this configuration, the anti-armor company can field three separate team GAC's simultaneously if necessary. The section not used initially in the team GAC's acts as a reserve force or augments the scouts. The two headquarters elements not used initially help to plan and execute future missions and assist in the battle-tracking of ongoing GAC's. Cross-training throughout the entire company is needed for this task organization to work effectively.

Who's the Boss?

It is important to understand that the convoy commander is the tactical operator controlling the movement of the GAC. Even higher ranking officers accompanying the GAC must adhere to the directives and actions of the convoy commander.

The intelligence preparation of the battlefield by the battalion S2 and the careful consideration of the effects of METT-T, obstacles, and concealment on the military decision-making process help to determine the weapons configuration of the GAC. Then the convoy commander can use each weapon system in an anti-armor section, platoon, or company to its maximum capability.

The scout section travels 3 to 5 minutes ahead of the main body of the convoy to monitor enemy activity, relay road conditions to the convoy commander, and provide early warning for the convoy. The lead element maintains the speed of the convoy and monitors the space between vehicles. The convoy commander collocates himself with the lead element and uses secure communications to contact the fire direction center (FDC) for indirect fires or counter-battery fires, and to order close air support and medical evacuation vehicles. The trail element positions itself so it can respond immediately to enemy contact. If needed, the trail element also assists in evacuating casualties and securing the escorted vehicles. The platoon sergeant at the rear of the convoy monitors the overall movement of the convoy and controls vehicle recovery and casualty evacuation.

The GAC operation is divided into five phases: planning, staging, loading, movement, and offloading. As with any successful mission, troop-leading procedures must be followed. Receiving the mission and issuing a warning order are standard. However, a basic knowledge of the GAC concept is essential to planning an effective GAC mission.

Planning

A tentative weapons configuration, task organization, terrain analysis, and coordination with the augmenting slice can be completed during the planning stage. Tentative indirect fire targets can be plotted and forwarded to the FDC to be placed on the fire-support matrix. It is important to pay close attention to terrain and vegetation when discussing fire support. Even though the FDC ultimately decides what munitions they will deliver, environmental observations along the route help in their analysis.

Tentative casualty plans for the primary and alternate routes should be established, and casualty pickup zones, phase lines, checkpoints, rally points, suspected or known ambush sites, obstacles, and "no-go," "slow-go," and "go" terrain should be plotted the modified-combined obstacle overlay.

Initial convoy movement and route reconnaissance should be plotted first on a map. If aircraft are available, an overflight of the route by the convoy commander is recommended. Aerial photographs from air reconnaissance should be used if they are available, along with any other intelligence information the S2 can offer. The convoy commander should meet with battalion scouts to see if the routes have been inspected recently and to get an update of enemy activity in the battalion area of operations.

If time permits, a route reconnaissance should be conducted by the scout element to help in the planning process. The remainder of the GAC element should move to the initial staging area and establish a linkup point. If there is not enough time for a full route re-

connaissance, the accumulated information from the battalion scouts, S2, and observation by air should be used for completing the order.

Staging

The staging area should be centrally located and well suited for disseminating the GAC operations order. The operations order should place a heavy emphasis on the overall concept of the operation, fire support, combined arms support, casualty evacuation, and obstacle-breaching plans (conducted by either engineer support, infantry troops from the BSA security force or battalion reserve, or GAC personnel). Likewise, the march order, primary and alternate routes, convoy speed and vehicle distance, checkpoints, phase lines, rally points, actions on contact, and time schedule should be stressed.

The staging area also offers secure areas for rehearsals and pre-combat inspection of vehicles and personnel. Vehicle windshields should be lowered or removed, shatterproofed, and secured to the hoods of the vehicles with cargo straps. Vehicles also should be prepared for survivability by sandbagging the floors and sides of each to protect the occupants from mines and small-arms fire. While the vehicles are in the staging area, the weapons configuration on each should be checked to see that the weapons function properly. Likewise, personnel should be checked to make sure they have the proper ammunition and night-vision goggles. A communication exercise should be conducted in the staging area by the GAC element before the escorted vehicles arrive and again after they arrive. Also, it is vital that all key leaders and drivers of the GAC and escorted vehicles conduct react-to-contact drills in the staging area.

Loading

The loading phase of the GAC is a small piece of the operation, but it is still vital to the mission. The convoy commander verifies the order of march and coordinates with the escorted vehicles' point of contact on the placement of all vehicles in the convoy. The squad leader, platoon sergeant, or company first sergeant ensures that all personnel and equipment are accounted for and that personnel are loaded in vehicles in a way that allows them to dismount quickly in the event of enemy contact. It is a good idea for the BSA security force or battalion reserve and the escorted vehicle personnel to load all vehicles in the same manner, keeping squad integrity of vehicles and cross-loading key leaders and machinegun crews.

Movement

As the GAC crosses the line of departure and begins its movement along the route, all vehicle drivers must monitor their radio nets for information from the convoy commander. In the event the convoy is ordered to halt unexpectedly, the vehicles should be prepared to assume a herringbone formation. (In a herringbone formation, vehicles are arranged at left and right angles to the line of march used to establish security during an unscheduled halt.) If enemy forces are known to mine or booby-trap the sides of roads, the herringbone technique must be executed with precision. The convoy commander will direct the convoy to reposition itself if needed. If a halt lasts longer than 1 minute, gunners on the TOW carriers will maintain 360-degree security while drivers dismount and position themselves to ensure rear security of their vehicles. Passengers will dismount when ordered by their element leaders. If the convoy comes in contact with the enemy, it is vital that each element follows all commands from its leader. After enemy contact, the GAC will reorganize and continue the mission.

Offloading

As the GAC nears its release point, the convoy commander will use proper far and near recognition signals with the receiving unit and perform link-up operations. After the GAC element delivers the escorted vehicles, the convoy commander will assemble all GAC elements to conduct an outbrief and issue fragmentary orders or initiate a return to the company area of operations by an alternate route. This is essential for the safety of the GAC.

I hope this article will be useful to units that are developing their own SOP's for the GAC mission. Summaries of ground assault convoy operations are found in a number of field manuals, including FM 17-95, Cavalry Operations; FM 17-98, Scout Platoon; FM 19-4, Military Police Battlefield Circulation Control, Area Security, and Enemy Prisoner of War Operations, and FM 71-1, Tank and Mechanized Infantry Company Team. **ALOG**

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Artillery Ammunition in the Korean War

by Captain David A. Martin

As the war became a stalemate across the Korean peninsula, artillery assumed a dominant tactical role and ammunition logistics became crucial to success.

Artillery has been and remains the great killer of communists. It remains the great saver of soldiers, American and Allied. There is a direct correlation between piles of shells and piles of corpses. The bigger the former, the smaller the latter.

—General Matthew B. Ridgway

Artillery is sometimes called the "King of Battle." Never was that nickname more deserved than during the Korean War. The way in which the war developed created a key role for artillery, and since artillery requires a robust logistics commitment—perhaps more than any other combat arm—it should come as no surprise that artillery logistics requirements influenced the entire conflict.

Several factors were responsible for the important role artillery assumed in the Korean War and for the influence of ammunition requirements on the war's conduct. Rapid maneuver during the opening months of the conflict soon gave way to stalemate, somewhat like that experienced in World War I. As a result, during the last 2 years of the Korean War, while the truce talks at Panmunjom progressed at a glacial pace, U.S. commanders relied on artillery to do the lion's share of the fighting: interdicting enemy movements, responding to enemy batteries, and countering enemy offensive actions. The beginning of the truce talks led to a change in battlefield tactics, with the artillery barrage replacing the hill assault as the primary battlefield activity. The number of artillery pieces increased during the course of the war, which, of course, led to greater demands for ammunition.

However, the ability of the U.S. defense industrial base to meet the demand was affected by the change from a wartime to a peacetime economy that occurred after World War II. It took time to establish production lines and increase ammunition output. Two other factors also affected ammunition logistics. Distribution problems in Korea, resulting from a poor transportation network, hilly terrain, adverse weather, and the flow of combat, sometimes created local shortages of ammunition. And changes in the standard for days of supply for ammunition complicated logistics planning. Increases in the standard had the effect of making supplies on hand instantly inadequate—without a single round having been fired.

Artillery and Ammunition in Korea

The United Nations (UN) forces used three basic calibers of artillery during the Korean War: 105-millimeter (mm), 155-mm, and 8-inch. However, the artillery rounds did not come completely assembled. The 155-mm and 8-inch howitzers fired separate-loading ammunition, which was composed of four separate components: primer, propellant, projectile, and fuse. Components were issued and delivered separately, which created a logistics nightmare. The 105-mm howitzers in the UN inventory fired semifixed ammunition; propellant was divided into increments, or charges, and the charges were tied together and stored in cartridge cases. Each howitzer crew adjusted the charge by lifting the projectile from its case, removing increments not required, and returning the projectile to the case.

The forces in the field also required several different ammunition types. Depending on the tactical situation, maneuver commanders could call for smoke, illumination, or high-explosive ammunition, and each type required a different shell-and-fuse combination. The average 155-mm round, fully assembled, weighed almost 100 pounds. The standard 105-mm projectile weighed half that, and the 8-inch round weighed an average of 198 pounds. Thus, delivery of artillery rounds required a significant lift capability in terms of both weight and volume.

Effects of Demobilization

After World War II, the United States quickly demobilized. The Ordnance Department almost ceased to exist. Eventually, the munitions inventory became un-

balanced. For example, for every five propellant canisters of 105-mm ammunition, there was only one shell casing and fuse. The number of management personnel was insufficient to examine this imbalance and supervise ammunition stockpiles.

The defense industrial base of the United States also throttled down from its wartime footing. When hostilities broke out in Korea in June 1950, businesses were reluctant to convert to munitions manufacture, figuring that the Korean situation would be settled in weeks. Once Congress appropriated funds for munitions, manufacturers needed 18 to 24 months to fulfill the contracts. In the war's initial stages, the Army's lack of field artillery pieces was probably fortunate—at least from a logistics standpoint—because it depressed the demand for ammunition. Fewer guns required fewer rounds.

In addition to the units committed to Korea, seven divisions remained in the United States, but only one, the 82d Airborne Division, was fully operational, and it comprised the Strategic Reserve. The General Reserve, in particular, was short of artillery, having only 11 battalions (four of 105-mm howitzers, five of 155-mm howitzers, one of 155-mm guns, and one of 8-inch howitzers). In early 1951, General Douglas MacArthur, the Supreme Commander of the UN forces in Korea, requested the immediate commitment of those battalions to the Korean theater of operations. However, the Joint Chiefs of Staff, having decided that they had to husband assets to maintain Western European defenses, authorized the deployment of only five battalions to Korea.

MacArthur needed the artillery battalions because the four divisions he had in Korea were short of artillery. For example, each field artillery battalion lacked a third of its howitzers. The shortage of assets was particularly acute at the division artillery, or DIVARTY, level. A typical DIVARTY modification table of organization and equipment (MTOE) allocated three or four field artillery battalions of 155-mm howitzers.

The plight of the 24th Infantry Division illustrates the situation that prevailed in Korea in the war's early days. As Dr. William Glenn Robertson observed in *Leavenworth Papers* ("Counterattack on the Naktong, 1950"), "The 24th Infantry Division's artillery component was greatly reduced as a result of both the peacetime practice of deleting one firing battery from each battalion and the wartime losses associated with forced retrograde movements." The after-action review went on to cite other causes for the less-than-stellar performance of the division, such as an inadequate supply of illumination artillery ammunition and mortar rounds and a doctrinal void on how to deal with tube shortages.

MacArthur also noted that division commanders did not fight their entire divisions. The hilly terrain and the limited road network in Korea forced commanders to fight their divisions as regiments or battalions. Since only four field artillery battalions were present in Korea at that time, MacArthur needed six additional battalions to meet MTOE requirements (one battalion for each regimental combat team). For general support artillery, he had two battalions of 8-inch howitzers, which were spread across the entire front. Procuring ammunition for additional howitzers during the initial maneuver stage of the war strained supply lines.

Active Defense

General Matthew B. Ridgway replaced MacArthur in April 1951. Eighth Army, commanded by General James A. Van Fleet, expanded to 4 corps (including 7 U.S. divisions and 10 Republic of Korea [ROK] divisions). After MacArthur's ouster from command, the combat situation more or less stabilized. Major operations were canceled because senior commanders did not want to influence the truce talks adversely or waste their soldiers' lives when a truce seemed imminent.

Van Fleet shifted to an active defense posture. The enemy would be vulnerable to massed artillery fire if he attacked. Ridgway sought to bolster his artillery defenses and requested five 155-mm howitzer battalions, four 8-inch howitzer battalions, and one 155-mm gun battalion. In response, the Joint Chiefs of Staff sent four artillery battalions, stripping the General Reserve to a bare minimum and further delaying the Western European buildup.

Throughout the Korean War, senior commanders like Ridgway sought to offset the huge Communist manpower advantage through the use of artillery and firepower. The conflict evolved into a contest between manpower and firepower. Logistics problems resulted as commanders sought to overcome an 8:1 Communist manpower advantage through a 100:1 UN firepower advantage.

Enormous amounts of artillery ammunition were expended. During a 60-day period in 1951, the 314th Ordnance Ammunition Group established 17 forward ammunition supply points to deliver artillery rounds to three corps (I, IX, and X). A total of 158,303 tons of ammunition was delivered, the equivalent of 27 Liberty ships or 39,527 2½-ton truck loads. X Corps Artillery fired 49,986 rounds in one day (22 May 1951).

Nondoctrinal Solutions

The need to procure precious ammunition eventually led to several nondoctrinal innovations. Firing units were not emplaced to support a maneuver unit in contact with the enemy; instead, artillery commanders or logisticians sited them close to railheads and other supply lines. Munitions were offloaded directly from railcars to gun positions (a distance of less than 100 meters in some cases).

The 1st Cavalry Division used another nondoctrinal approach. The division ammunition officer (DAO), while conducting a reconnaissance of port facilities days before the division's commitment to Korea in July 1950, discovered that he could not rely on ammunition stockpiles in the theater. The division therefore deployed with extra unit basic loads for artillery: 2 unit loads of 155-mm ammunition and 5 unit loads of 105-mm.

How to offload the ammunition was another challenge. Doctrinally, the DAO was supposed to allocate, not handle, the division's ammunition. To move ammunition in Korea, however, the division commander placed the division's ordnance company under the DAO's operational control. Other arriving divisions soon adopted this novel approach.

ROK Artillery

Bolstering the ROK Army's field artillery increased the demand for ammunition. Major General Paik Sun Yup, commander of the ROK 1st Division and hero of the Pusan defense, later recalled, "The weakness of our artillery was a major reason why units found themselves fighting for their lives so frequently." Arguably the ROK's ablest general, he expanded the artillery base of the ROK Army by establishing an artillery school at Kwangju and rebranching capable infantry officers into artillery. He sought to eliminate the disdain for artillery officers that permeated the ROK Army. ROK artillery officers eventually rose to eminence.

General Paik also bolstered the artillery strength of the ROK Army division from one 105-mm battalion to one 155-mm battalion and three 105-mm battalions. Ammunition requirements increased accordingly. The heightened logistics requirements concerned General Mark Clark, who succeeded Ridgway in May 1952: when six ROK 155-mm battalions became active, the Far East Command had to supply 486 artillery pieces instead of 378.

ROK artillery doctrine, as taught at Kwangju, did not help the ammunition situation. That doctrine called for mass expenditure of ammunition during unobserved fire missions. U.S. commanders, by contrast, seldom used unobserved fire, calling it a waste of precious ammunition. In May 1952, General Paik responded to the alleged discovery of a Chinese staging point by unleashing the most powerful artillery barrage ever fired by ROK artillery up to that time, firing 20,000 rounds in 19 hours. The Chinese attack never came.

Paik's barrage stimulated much debate. Responding to U.S. criticism, Paik defended his course of action: "We had no way to verify the extent of damage, but there is no reason to doubt that the tremendous display caused the Chinese to change their minds about launching an offensive aimed at ROK II Corps."

Politics, Economics, and Artillery Ammunition

Artillery ammunition became a significant political issue of the day. Resupply proceeded slowly, and Congress investigated usage rates. The press reported ammunition shortages, and a major scandal broke out on the front pages of many newspapers. President Dwight D. Eisenhower requested a briefing from General Clark

☐ The hilly terrain and poor road network of Korea complicated tactical operations, even for units using smaller guns. Here, soldiers of the 2d Infantry Division and laborers of the Korean Service Corps maneuver a 75-mm recoilless rifle into firing position near Yangku in August 1951.

on the ammunition shortages and allegations of mismanagement and waste.

Some U.S. commanders went on record as preferring General Paik's approach. General Van Fleet said that the barrage "allowed us to steal a march on the enemy, preventing it from launching an attack, resulting in extra weeks of quiet which decreased friendly casualties." He felt that the quickest way to establish mastery over the Chinese was intimidation through demonstrations of sheer firepower. President Eisenhower agreed. The press eventually lost interest in the matter, but not before establishing a moniker for an enormous expenditure of artillery ammunition: the "Van Fleet Supply Rate."

U.S. production lines turned out 100,000 155-mm rounds in July 1952. The authorized daily supply rate was 40 rounds per gun. To provide those 40 rounds for each of the 486 artillery pieces in the Korean theater required the manufacture of 583,200 rounds per month. Production was slowed when 60,000 forgers of the Christie Park Plant in Pittsburgh went on strike in June 1952. The strike lasted for 54 days, but it had a ripple effect on ammunition supply that in October 1952 caused Van Fleet to limit his guns to 6 rounds per day.

In response to the strike, alternative sources of ammunition were sought. The Japanese had 600,000 rounds for sale, but the Army rejected that procurement because of its cost. (The Japanese round was one and a half times more expensive than its U.S. counterpart).

Fierce actions in September and October 1952 reduced stockpiles to a 26-day supply—an all-time low. During this fighting, Eighth Army fired 423,000 105-mm shells in just 6 days. To support Korea, theater stocks in Europe were depleted even further and reached critically low levels.

The artillery barrages that resulted from the static situation in Korea were fed by stockpiling ammunition for days beforehand. The changing nature of the war also increased demand. The 2d Infantry DIVARTY fired over 153,000 rounds against Bloody Ridge in August and September 1951. In one 24-hour period, the 15th Field Artillery Battalion fired 14,425 rounds.

Commanders continued to seek out ammunition reserves. Van Fleet feared that the Communist negotiators would seek to freeze current ammunition stocks, so he asked for permission to increase his level of supply from 30 to 45 days. In 1952, the Joint Chiefs of Staff and General J. Lawton Collins, the Chief of the Army, asked Van Fleet to look again at his ammunition usage and supply requirements. Eighth Army spent $750 million on artillery ammunition in that year alone. Of all fire missions, 68 percent were for interdiction, 19 percent were counterbattery actions, and 15 percent were responses to enemy actions. Van Fleet was encouraged to limit unobserved interdiction missions.

Later in 1952, Under Secretary of the Army Earl D. Johnson, noting the large task of providing ammunition, requested that General Collins examine the possibility of substituting mortar for artillery fire. Secretary of Defense Robert A. Lovett meanwhile continued to divert ammunition destined for other theaters to Korea and directed units in Korea to recycle brass casings. He also sought to reduce allocations for each 155-mm howitzer to 9.4 rounds per day. Increased congressional appropriations for munitions in 1951 began to bear fruit in late 1952 and early 1953, just as the action in Korea wound down with the imminent signing of the truce.

General Van Fleet, appearing before a congressional subcommittee in 1953, cited several reasons for the huge artillery ammunition expenditure in the war. The increase in Chinese artillery necessitated an increase in counterbattery missions. Furthermore, the enemy usually was dug in at targets like Bloody Ridge, so direct hits by direct fire were needed. According to Van Fleet, the UN was fortunate that the Chinese never launched an all-out offensive during a period of UN ammunition shortage.

U.S. Artillery and Ammunition in Korea Today

A technological revolution of sorts impacted artillery in the 1980's. Korean War-era technology was replaced with push-button warfare and the pinpoint accuracy of today's artillery. The deadly precision of the M109A6 Paladin howitzer and the destructive potential of the Multiple Launch Rocket System (MLRS) require less ammunition logistics support than artillery did in the Korean War.

Nonetheless, accuracy does not necessarily mitigate ammunition needs. With two howitzer battalions and one MLRS battalion currently stationed in Korea, the Army clearly will have to do more with less. The 15th Field Artillery Battalion's expenditures of ammunition in 1951 are unthinkable today. Even in the Gulf War, howitzer battalions fired nothing close to the 15,000 rounds a day fired by the 15th in Korea.

While U.S. artillery on the Korean peninsula bolsters ROK defenses against one of the world's most dangerous adversaries, it also is worth remembering that, as in 1950, any military action today probably will commence with an artillery duel requiring large expenditures of ammunition. If history holds any lessons, only the strength of the economic and political base of the United States will win the war. **ALOG**

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Handling Munitions as Hazardous Waste

by Michael F. Flannery, Jr.

The Environmental Protection Agency's Military Munitions Rule affects the management of Army ordnance and complicates the handling of ammunition. Logisticians not only should know how the rule works—they should take the lead in how it is administered on their installations.

If you are a logistician who has any involvement with moving, storing, handling, or managing munitions, you need to become familiar with new Federal and state rules governing hazardous waste. Why? Because the U.S. Environmental Protection Agency (EPA) has issued its final Military Munitions Rule (MR), which regulates when munitions (both conventional and chemical) should be considered hazardous waste. This rule is important because it affects how you, as a logistician, manage a core military commodity—munitions—and because it is the law.

The MR responds to the need for clear rules on when the Resource Conservation and Recovery Act (RCRA) of 1976—which governs the storage, treatment, and disposal of hazardous waste—applies to military munitions. The EPA published the MR in February 1997, and it became effective on 12 August 1997.

What really complicates life for logisticians is that under the RCRA, states can operate their own hazardous' waste programs and set requirements that are more stringent than the Federal requirements. In other words, the states can be stricter than EPA. The EPA MR became effective in August 1997 in Alaska, Hawaii, and Iowa—the three states do not have EPA-authorized RCRA programs. All of the other states have the opportunity to accept the EPA's MR or adopt their own, more stringent requirements. As of this writing, Alabama, Arizona, Georgia, Idaho, Mississippi, Nevada, Oklahoma, Oregon, and Puerto Rico have adopted either the EPA MR by reference or a slightly modified version of the EPA MR.

Logisticians who experienced the severe trauma of hazardous waste fines and penalties a few years ago, may see the potential for an even more difficult transition to compliance with MR requirements. The challenge of meeting the new MR requirements is increased by the possibility of having to comply with differing state regulations. Compliance may be complicated because of the state in which an installation is located. So, in the absence of a national rule, it is even more important that soldiers, sailors, marines, and airmen, as well as civilian workers, be trained to the appropriate standards for handling munitions.

Working With the States

Publication of the MR generated lots of activity at the headquarters of the armed services. Their concern

was whether or not those states with their own RCRA programs would modify the EPA's rule. To work with the states on this issue, the services held partnering meetings with approximately 15 states that had expressed a keen interest in the MR. These meetings included visits to McAlester Army Ammunition Plant in Oklahoma to see how munitions are manufactured and demilitarized and to the Marine Corps Air Ground Combat Center at Twentynine Palms, California, to see live-fire demonstrations and range-clearance operations. In addition, Army regional environmental coordinators from the Army Environmental Center's Regional Environmental Offices, along with regional environmental coordinators from the other armed services, visited with virtually all the state environmental departments over the past year to brief them on the MR and the military's implementation plans.

In the Pentagon, a special working group known as the Munitions Rule Implementation Council (MRIC) has been functioning for almost 2 years. The MRIC is comprised of representatives from all the services and is chaired by a colonel from the Army's Office of the Deputy Chief of Staff for Logistics. The MRIC issued an Interim Department of Defense (DOD) Implementation Policy to field activities in February 1997. This interim policy has undergone several revisions, and the MRIC has been working with the major Army commands (MACOM's) and environmental regulators to develop a consensus on a final policy. The Final DOD Implementation Policy was scheduled to be issued this summer.

Military Munitions Rule Guidelines

EPA Military Munitions Rule
State Military Munitions Rule (if applicable)
DOD Implementation Policy
DOD 6055.9-STD (DDESB-as revised to include the Waste Storage Standards)
EPA Technical Amendments to the Military Munitions Rule

☐Logisticians should be familiar with these documents on the Military Munitions Rule.

The 70-page Implementation Policy has 11 chapters and 3 appendices and contains "how to" information for interpreting the requirements of the MR. Its stated purpose is to establish an overarching policy for managing waste military munitions that is consistent among the armed services. The policy discusses complex subject matter, such as the effect on range operations, emergency responses, and special rules for chemical munitions when used and unused munitions become waste.

Still another player in this very complex matter is the Department of Defense Explosives Safety Board (DDESB), an organization established by Congress in 1928 after an investigation into the explosion and virtual destruction of the Naval Ammunition Depot in Lake Denmark, New Jersey. That 1926 accident killed 21 people, injured another 51, and caused $46 million worth of damage. Since its creation, the DDESB has been instrumental in providing effective safety oversight of the testing, development, manufacture, handling, transportation, maintenance, and demilitarization of munitions, including those containing chemical agents.

The DOD Ammunition and Explosives Safety Standard, DOD 6055.9-STD (most recently revised in January 1998), forms the basis of the DOD explosives safety program. On average, 20 ammunition and explosives accidents are reported to the DDESB each year. This may seem to be a high number, but, given the quantity of munitions moved and used worldwide by all of the services, this is a good track record. Most of these accidents occur at manufacturing facilities where munitions loading, assembling, and packing take place. The rest occur during disposal operations, training exercises, and unauthorized handling of unexploded ordnance.

Expanding the Scope of DOD Standards

The DDESB Explosives Safety Standard, which has been a successful management tool over the years, is the primary basis for regulating munitions, including their handling as waste. However, the safety standard is an internal DOD standard and not subject to the EPA rulemaking procedures requiring public comment. This gives some environmental regulators and their constituents cause for concern.

Therefore, a "gap" analysis comparing DOD 6055.9-STD and the RCRA was performed. The DDESB standard then was amended to include specific

instructions about storing waste munitions. These are the so-called "Waste Storage Standards," which were adopted by the DDESB in January 1998. The changes under these standards include the requirement for adoption of local standing operating procedures for all munitions storage units (such as ammunition supply points) that address safety, security, emergency preparedness, and environmental protection concerns. "Closure" (a hazardous waste term) of "conditionally exempt" (CE) storage bunkers used for waste munitions is required when they are taken out of service. Additionally, there is no CE category allowed for storage bunkers that have existing DDESB waivers or exemptions, and there are "termination of use" procedures for all storage bunkers.

On top of all this, the EPA plans to issue technical amendments to its MR. It is believed that these amendments will serve mostly to clarify the MR by fixing misidentified paragraphs and providing cross-references, but there also are likely to be some explanations and interpretations included as well.

Training Is Imperative

If you are a logistician in the class V business and these terms and acronyms sound strange and confusing, you are forewarned that training and expertise in the subject is essential to successful compliance. Logisticians should take ownership of the MR and not repeat the experience of the early 1990's that saw environmental staff—instead of the logistics community—take on the oversight of the hazardous materials mission by default along with the hazardous waste mission. That situation is slowly turning around as the logistics community begins to assume responsibility for hazardous materials management and take advantage of pollution prevention opportunities through formation of installation hazardous material management centers (sometimes called HAZMART's or pharmacies). Logisticians also have begun to demonstrate improved management of hazardous waste treatment storage and disposal facilities (TSDF's) and hazardous waste disposal contracts by the Defense Logistics Agency.

Now, instead of letting the environmental community run the show, logisticians should take the lead and let environmental personnel and others provide the staff assistance to a team effort supporting this readiness issue. The Army is the commodity manager for conventional chemical munitions for all of the armed services and owns the chemical munitions stockpiles. Arguably, munitions is *the* single most essential category of logistics required for the military to perform the warfighting mission. And logistics, of course, wins battles.

Fortunately, the logistics community has been in on discussions about the MR at Department of the Army headquarters from the outset. Logisticians should be the MR operators all the way down to unit and installation levels. That is because they, not environmental personnel, are in the best position to make determinations and handle munitions when munitions become waste.

Training on the MR at your installation should be the vehicle to assure compliance. Of course, the installation commander must be aware of the requirements of the MR. In addition, the following individuals at the installation level need to form a team and become increasingly knowledgeable about the MR requirements of your state: the ammunition manager, ammunition supply point manager, quality assurance specialist–ammunition (QASA), explosives safety officer, explosive ordnance disposal (EOD) personnel, trainers, range officer, public affairs specialists, environmental attorney, and environmental protection specialists. I'm sure you can think of a few more.

How do you get the required training? The training package being prepared by the Army Defense Ammunition Center—recently relocated to McAlester Army Ammunition Plant from Savanna, Illinois—should be available. It provides a CD-ROM self-study program that covers the DOD Implementation Policy and contains general scenarios most likely to be encountered in dealing with the MR. But contact the director of logistics at your MACOM; this subject is too complex for the self-help approach alone. The MACOM should be able to provide information and perhaps a training team that can address the requirements of your state. Your Army regional environmental coordinators can be of assistance and can communicate and resolve MR issues with your state environmental authority, but the requirement for training lies within your chain of command.

As soldiers, you understand that the threat from munitions is first and foremost related to their explosive nature. The threat to the environment resulting from waste munitions now must be added to your list of concerns. Keeping abreast of the Military Munitions Rule will make you a better logistician while ensuring that Army munitions are ready when needed. **ALOG**

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Water Support of Exercise Bright Star '97

by Steven L. Mayerhoefer

There is nothing more critical to desert operations than water. It is the lifeblood of our soldiers. To meet this critical requirement, the planners for Exercise Bright Star '97 explored the use of packaged water and ice systems designed by the Army Forces Command (FORSCOM). Third Army coordinated with FORSCOM to deploy the water-packaging system (WPS) and the containerized ice plant (CIP) to Egypt and provide bag water and ice to the class I (subsistence) point, which was the 18th Quartermaster Company from Fort Bragg, North Carolina.

The FORSCOM Materiel Management Center's (FMMC's) water team set up their water operations at Pyramid Base, which was near the Mubarak Military Community. The team was attached to the 87th Corps Support Battalion (CSB), 24th Corps Support Group, Fort Stewart, Georgia. The exercise offered the FMMC an opportunity to deploy the WPS and the new CIP and support U.S. forces in a large multiservice exercise. The desert provided a new operating environment for "stressing" the systems.

Water Packaging System

Although the WPS consists of both commercial and military equipment, its primary component is a commercial, vertical-feed, form, fill, and seal machine that packages water in 1-liter bags at a rate of 28 bags per minute. This machine is the same as the type used by industry to package potato chips, individual packs of condiments, liquid soaps, candies, and most other prod-

☐ One-liter water bags exit the form, fill, and seal machine and drop into a catch box at a rate of 28 bags per minute.

☐ Soldiers from the 87th CSB help pack and palletize packaged water. The water will be inventoried, loaded, and shipped downrange.

ucts that require packaging. Some of the military components in the WPS are a trailer; 3,000-gallon water storage bladders (onion skins); a "water buffalo" (400-gallon water tank); a 20-foot, expandable shelter; pumps; and hoses from a reverse osmosis water purification unit (ROWPU). The form, fill, and seal machine is housed inside a shelter to provide a sanitary work environment and protection for the equipment. The shelter is mounted on a 40-foot trailer for mobility. Secondary items, tools, spare parts, and supplies are transported in 20-foot ISO containers. During the last 2 years, the WPS has supported Bosnia operations; Exercise Roving Sands '96 in New Mexico; Marines at Camp Lejeune, North Carolina; and Bright Star '97.

The WPS has been transported by ship, train, plane, and military and commercial trucks. It functions well in most environments. FORSCOM has three WPS's in its inventory. Water processed through the WPS is always from a water source that has been approved by the local preventive medicine (PM) unit. The source water is processed through a ROWPU and tested by the PM unit before packaged water production begins.

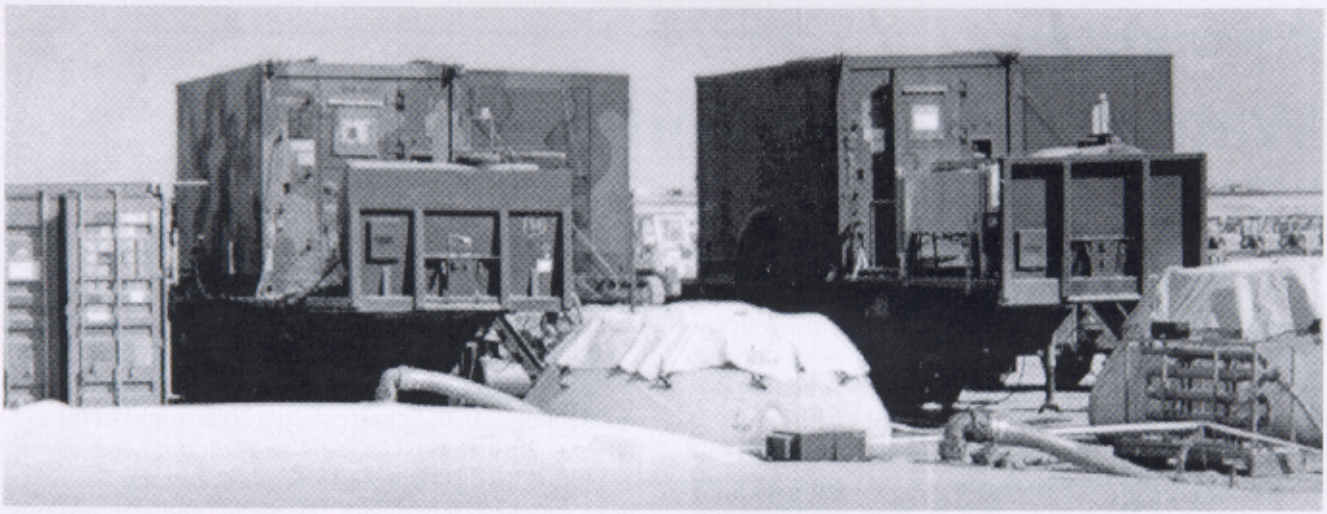
Containerized Ice Plant

The CIP also consists of both commercial and military equipment. Like the WPS, the commercial ice machine is housed inside an expandable, trailer-mounted shelter. The military equipment includes 3,000-gallon water storage bladders and a 400-gallon water buffalo. This is the first Army prototype for a deployable ice plant, and Bright Star '97 was the first time it had been deployed. The CIP produces up to 10,000 pounds of 1-inch tube ice per day. The packaging system automatically packages the ice in 20-pound bags. Like the WPS, the CIP uses water that has been processed through a ROWPU and tested by the PM unit before packaged water production begins.

Soldier Support

Bright Star '97 was also the first time soldiers were involved in a packaged water and ice operation. Earlier packaged-water missions in Hungary and for Exercise Roving Sands '96 were conducted by contractors. Quartermaster Corps water purification specialists (military occupational specialty [MOS] 77W) worked with the FORSCOM water team and helped to operate the WPS and CIP equipment. Eight soldiers assisted with water and ice production, and they clearly demonstrated that they have the technical ability to operate the WPS and CIP. The 87th CSB provided additional soldiers (various MOS's) to help box the packaged water and ice and stack the boxes on pallets.

Using military labor reduces the cost of packaged water and ice operations by replacing contracted labor. However, any packaged water and ice operation supported by soldiers needs to be evaluated closely to en-



☐ **Both the water-packaging system (left) and the containerized ice plant (right) are housed inside expandable, trailer-mounted shelters and use water that has been processed through a reverse osmosis water purification unit.**

sure that it does not detract from the unit's primary mission or operating tempo.

Lessons Learned

Because the WPS and CIP systems operated in a desert environment, they required some additional procedures, as expected, to maintain acceptable sanitary conditions and operational standards. Plexiglas doors were added to the systems to keep sand from blowing into the work areas, and dryers were placed on the air compressors to help prevent moisture buildup in the air lines. These modifications helped with sanitation and equipment reliability, but additional cleaning was required to maintain a sterile work environment within the shelters. Severe sandstorms sometimes stopped production of packaged water and ice. Soldiers outside who operated the forklift, boxed and palletized the bag water, and transferred ice bags into reefer vans had to stop work and move inside until the storms were over.

The CIP performed well for 12 days and then developed an electrical problem that was not related to the desert environment. It was disappointing that the replacement part could not be received in time to continue ice production. The water team will review the current prescribed load list (PLL) and possibly increase the PLL lines to prevent unnecessary down time and improve support in the future.

The benefits of using the packaged water and ice systems for major exercises and deployments include reduced costs, quality control of drinking water, reduced transportation requirements, deployable systems, shorter reorder time, cost savings over alternative commercial products, improved command and control, mass storage (versus daily production), same-day delivery, reduced risk of tampering during shipment, and suitability for various distribution methods.

The packaged water and ice operation offers the military and other Government activities an alternative means of providing water support of major exercises, deployments, and disaster operations. Packaged water and ice are sensitive commodities that can be produced within the patrolled perimeters of U.S. forces, reducing the threat from terrorists.

Commanders are encouraged to use WPS's and CIP's during major exercises and deployments. The systems are also available to support Federal Emergency Management Agency operations during national disasters. For additional information, call (404) 464-7637 (DSN 367-7637) or send an e-mail to mayerhos@forscom.army.mil.

Editor's Note: Since this article was written, the FORSCOM water team deployed to Thailand to provide packaged water and ice support to Exercise Cobra Gold '98. The team was sponsored by U.S. Army, Pacific, and was attached to the 17th Forward Support Battalion. The CIP received great responses from the troops, who felt that ice is a great commodity to have in the field. Temperatures in Thailand were usually over 100 degrees with 100-percent humidity. **ALOG**

Steven L. Mayerhoefer is the project officer for the water-packaging system and the containerized ice plant in the Materiel Management Center, Office of the Deputy Chief of Staff for Logistics and Readiness, Army Forces Command, Fort McPherson, Georgia. He has a bachelor's degree in business administration from Shorter College in Marietta, Georgia.

Commentary

Water Purification on the Go

by First Sergeant Richard A. Montcalm, Sr.

One of the biggest "showstoppers" for the infantry has been providing potable drinking water to troops when and where needed. In the past, units on patrol used purification tablets to treat water found in sources along their route of march. But the tablets do not remove protozoa such as Giardia Lamblia and Cryptosporidium or waterborne viruses such as Polio virus type 1 or Rotavirus. Nor do they neutralize pollutants such as herbicides and pesticides.

The Army addressed the need for potable water to a great extent with the development and fielding of reverse osmosis water purification units (ROWPU's). These units produce adequate amounts of potable drinking water; however, they are stationary units, and the water they produce must be distributed through LOGPAC's, which could be delayed, misrouted, or disabled. The resulting deprivation of water could lead to serious medical problems, such as heat strokes and even death, for the affected soldiers.

For example, during a rotation to the Joint Readiness Training Center (JRTC), Fort Polk, Louisiana, in May 1995, my platoon, the 3d Platoon, A Company, 2d Battalion, 327th Infantry, 101st Airborne Division (Air Assault), was tasked to move the company's "dead" and "wounded" (the entire 1st and 2d Platoons) to a casualty point approximately 300 meters away. The soldiers went on the mission with four quarts of water each. Their rucksacks, which contained seven quarts of water, were to be brought forward later. At the end of the casualty evacuation, most of the soldiers had consumed two quarts of water because of the ambient air temperature of 89 degrees Farenheit with a heat index of nearly 100 degrees during the day. The company commander tasked my platoon to clear the company's sector, a 3-square-kilometer section of terrain that consisted mainly of swampy areas and palmetto and pine forests. After crossing the creek and swamp, the members of the platoon were completely out of water, and many were suffering from heat cramps.

The platoon leader and I agreed that we should call for an emergency resupply of water. Because of the long distance from the company command post, the tactical situation, and the remote location of our platoon, a LOGPAC vehicle could not reach us. So a UH–60 Black Hawk helicopter was dispatched 1 1/2 hours later with 30 gallons of water to resupply the platoon. This emergency situation could have been prevented if we had had an efficient, lightweight means of purifying water on the go.

The civilian backpacking community has several outstanding off-the-shelf products that could fit the bill. After testing several models and interviewing experienced soldiers, I identified a prime contender for use by light infantry, air assault, airborne, and ranger units. While it does not desalinate water—a standard set by the Army Combined Arms Support Command for a portable water purification system—the Sweetwater Guardian Plus with the Viralguard Cartridge would meet the needs of units on the "pointy end of the spear."

During their real-world deployments, soldiers in the 5th Special Forces Group (Airborne), Fort Campbell, Kentucky, experienced the same problem that my platoon encountered at JRTC. Three of their teams deployed to Bosnia-Herzegovina for an extended period. Since they did not have the luxury of direct support from an onsite ROWPU, and the local water supply was questionable at best, the teams purchased several portable, hand-operated, water purification systems. They chose the Sweetwater Guardian Plus because it was different from the "push-pull" systems they used while they were deployed to Somalia and other Third World countries. Those systems were not durable or reliable and were inoperable if the operating rod became slightly bent.

The Sweetwater Guardian Plus is self-contained, easy to operate, and produces water that is cleaner than that from a household faucet. It weighs only 11 ounces, produces 1 to 1 1/4 liters per minute and, with proper cleaning and maintenance, can produce up to 200 gallons of potable water between filter changes.

The combination filter used in the Sweetwater Guardian Plus consists of a four-micron pre-filter, a labyrinth ceramic filter, and an activated carbon filter. This is the most effective water filter on the market today. This filter also removes chlorine, iodine, herbicides, pesticides, trihalomenthanes, and volatile organic compounds.

I recommended the filter for adoption by the 101st Airborne Division in an effort to reduce a soldier's load. Carrying 4 quarts of water (8.8 pounds) and 1 filter (11 ounces), as opposed to 11 quarts of water (24.2 pounds) saves approximately 15.4 pounds, making a soldier's load lighter and giving him an edge while engaged in

simulated or actual combat.

The system is not intended to be a replacement for the ROWPU, but instead, a combat multiplier. Until overtaken by technology, the ROWPU will continue to be the primary source of water for the infantry. However, the Army infantry does not train routinely near or on salt or brackish water as does the Marine Corps. When it does, its leaders will find techniques for seeking or making desalinated water outlined in Field Manual 21–76, Survival. Also, the Army has ROWPU barges that produce more than 100,000 gallons of desalinated water a day, so water supply near a beach should not be a problem.

The Government would enjoy a significant cost saving by using a portable water purifying system. Based on information gathered from interviews and historical data from units deployed to JRTC, the estimated first-year cost savings to JRTC would be $261,344.15. This figure factors in the cost to purchase 177 Sweetwater Guardian Plus systems (the number recommended for fielding to three infantry brigades and the long-range surveillance detachment for the 101st Airborne Division during three JRTC rotations per year) and the cost to operate a UH-60 helicopter ($1,879 per hour) for water resupply. It does not include the millions of dollars that would be spent for phase maintenance of the helicopters used for water resupply.

The Sweetwater Guardian Plus may not be the complete answer to providing potable drinking water quickly. However, I believe it is a good interim solution until a better one comes along. An 80-percent solution right now is better than a 100-percent solution 5 years from now.

First Sergeant Richard A. Montcalm, Sr., is assigned to Joint Task Force-Bravo at Soto Cano Air Base in Honduras. He is a graduate of the Airborne, Ranger, Jumpmaster, Pathfinder, Air Assault, Jungle Warfare, and Hazardous Materials Handling Courses. He also has attended the Marine Corps Reconnaissance Swimmer and Waterborne Operations Courses and the Air Force Ground Operations School.

Rethinking Ammunition Management—Correctly

by Dr. Robert M. Ford

A recent commentary in *Army Logistician* (May-June 1998, page 38) once again raised the old topic of moving responsibility for class V (ammunition) from the Ordnance Corps to the Quartermaster (QM) Corps. The article also raised a new issue—moving "rocket and missile training" to other locations. The author, Mr. Rayburn, implies that these actions could save the Army millions of dollars in training costs.

Simple logic should suggest that wherever ammunition training occurs, it is still going to require the same amount of money. Before anyone considers moving class V materiel management training anywhere, it is important to remember that the site must be large enough to accommodate a theater of operations ammunition supply point (ASP). There also must be an ammunition magazine training area available.

The need to conduct live explosives training for ammunition specialists requires a demolition range. Explosive ordnance disposal training and hazardous devices training for law enforcement personnel also dictate at least one live explosive range. Each of these specialized training areas must be located 2,400 feet from inhabited buildings, public highways, overhead power lines, dams, bridges, piers, fuel storage areas, etc. That's the length of 8 football fields. My suspicion is that the area around the QM School at Fort Lee, Virginia, could not accommodate such requirements. That is not to say it couldn't be done. However, any reduction in the quality of training areas would be mirrored by a reduction in the quality of soldier training—certainly the last thing we would want to do.

As far as reassigning ammunition specialists to the QM Corps is concerned, I have to admit to having thought long and hard about this. During my last tour in Vietnam, I was reassigned from an ammunition company to its parent supply and services battalion to serve as the operations noncommissioned officer (NCO). I was reassigned there because the supply and services battalion's ammunition shipments had not been getting to the divisions in the right quantities, configurations, or types. In one case, 175-millimeter projectiles had been sent to an 8-inch howitzer battery. (All require-

simulated or actual combat.

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The need to conduct live explosives training for ammunition specialists requires a demolition range. Explosive ordnance disposal training and hazardous devices training for law enforcement personnel also dictate at least one live explosive range. Each of these specialized training areas must be located 2,400 feet from inhabited buildings, public highways, overhead power lines, dams, bridges, piers, fuel storage areas, etc. That's the length of 8 football fields. My suspicion is that the area around the QM School at Fort Lee, Virginia, could not accommodate such requirements. That is not to say it couldn't be done. However, any reduction in the quality of training areas would be mirrored by a reduction in the quality of soldier training—certainly the last thing we would want to do.

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ments from the divisions were fed through the S3 on a daily basis, not directly to the direct support companies.)

Because of my reassignment, I had to learn quickly the tasks of a QM NCO, or least to become knowledgeable enough to ship and receive classes I (subsistence), II (clothing and individual equipment), III (petroleum, oils, and lubricants [POL]), and IV (construction and barrier materials) correctly and to support graves registration. The knowledge I needed was gained on the job, and the experience taught me that each of these QM materiel classes requires specialized logisticians. And so does class V.

My unique position during that assignment showed me how multifaceted each of these logistician's fields is. It took me a long time to learn even the rudimentary complexities of class III management. To me, a tanker was a tanker, and you pumped gas into it and shipped it out.

As an ammunition NCO, I recognized the intricacies of the various types and uses of POL. I had to learn the capabilities of pipelines and 350- and 500-gallon-per-minute pumps. I never got really smart about class I, but I did learn that it was unbelievably difficult to compute how many reefer vans would be needed by each division each day. And graves registration was completely out of my league, although occasionally I did help with this somber and detailed battlefield task.

Well-meaning analysts who, in the not-too-distant past, combined military occupational specialties (MOS's) 55B (ammunition specialist), 55R (ammunition stock control specialist), and 55X (ammunition inspection specialist) into a single 55B specialty already have made the business of ammunition management more difficult. Previously, each of these specialties required complex task performance. Now the so-called "Super Bravo" does it all. I know of no ammunition subject matter expert who thinks this was, or is, a good idea. And now Mr. Rayburn suggests moving ". . . ammunition management from the Ordnance Corps to the QM Corps as another class of supply for QM soldiers to manage."

Ordnance Corps soldiers have handled ammunition with great expertise since the birth of the Continental Army. Somehow Mr. Rayburn feels that ammunition specialists ". . . lost their uniqueness when they lost responsibility for handling nuclear weapons." I'm not sure what that means, but I can tell you that when I was the first sergeant of an ammunition company that stored nuclear weapons in Korea, I didn't feel any more or less unique. Mr. Rayburn also states that ". . . the Army is no longer in the ammunition manufacturing business." Again, I'm missing something here. What is being produced at all those Government-owned, contractor-operated Army ammunition plants?

I can't address the comments about "rocket and missile training" from a subject matter expert position, but I do have two comments. First, if we move the training away from Redstone Arsenal, it still will cost the same. Second, the materiel developer for rockets and missiles is at Redstone Arsenal. Moving the trainers away from the integrated logistics support analysts can only degrade training planning and distance the instructors from the designers.

Mr. Rayburn has a courageous goal in wanting to centralize for the purpose of cost reduction, and he subsequently implies that training conducted at more than one site is redundant. He states, for example, that, ". . . we conduct turret training at three locations, and large and small missile training is conducted at two sites." I offer the analogy that we also conduct infantry training at an untold number of sites, and armor, artillery, aviation, military police, and other types of training at numerous locations—all of which are equally "redundant." Soldiers don't train at their various tasks only one time at one location, but over and over again at installation after installation. In this broader picture, we recognize that one of the significant attributes of training is that it is, in fact, *redundant*. Otherwise, we must accept the premise that we can save money by centralizing all infantry training at Fort Benning.

The best and brightest quartermaster people are in the community of Fort Lee, Virginia. The best and brightest ordnance, missile, and munitions people are in the community of Redstone Arsenal, Alabama. These communities of subject matter experts are where new ideas get their most critical and just reviews. By my observations, the recent scrutiny given to this perennial idea of melding ammunition and quartermaster services has confirmed that it should not be done.

Dr. Robert M. Ford is a master instructor in the Munitions Training Department, Army Ordnance Missile and Munitions Center and School, Redstone Arsenal, Alabama. He is a retired master sergeant who served in several ammunition companies and detachments as well as the infantry, explosive ordnance detachments, and combat engineers. He holds a Ph.D. in education administration and is a graduate of the Army Logistics Management College's Logistics Executive Development Course and the Army Management Staff College.