ARMY LOGISTICIAN

July-August 1999

Fueling the Force

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ARTICLES

DEPARTMENTS

COVER

The cover photos depict fuel storage and refueling operations during Operation Just Cause in Panama and Operation Provide Relief in Somalia and fuel training during an exercise at Fort Lewis, Washington. Articles beginning on pages 4 and 8 propose plans and options for fueling the force of the future.

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By Order of the Secretary of the Army:

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General, United States Army
Chief of Staff

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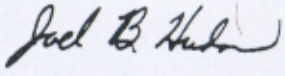

JOEL B. HUDSON
Administrative Assistant
to the Secretary of the Army
05834

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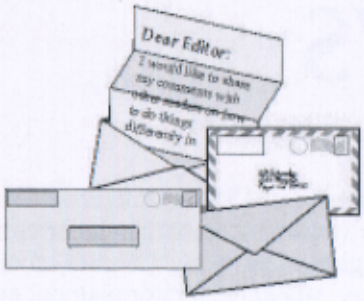

LOG NOTES

Readiness Rates and Supply Policy

I was reading the article "Changing Repair Parts Supply Policy" in your March-April 1999 issue when a sentence really hit a nerve. The sentence was in the section that described the new 1997 prescribed load list (PLL) criteria. The sentence that made me do a double take was: "Although the field still is not completely comfortable with these changes, the fact that equipment readiness rates remain at very high levels indicates that the Army can rely on velocity management to maintain readiness while spending less money on repair parts at the unit level."

I can only speak for myself based on 15 years of experience at the organizational maintenance level, but I think that saying readiness rates remained high with the new PLL criteria is a little off. Yes, on paper they are high, but behind the scenes is a different story.

The first and most important factor is that good maintenance sergeants, technicians, or officers will do their utmost to keep their unit from going below the 90-percent operational readiness (OR) rate established by the Department of the Army. By that I mean we will scrounge for repair parts, keep a nest egg of repair parts (to which no one will publicly admit), utilize the cannibalization yard, or basically beg, borrow, and steal. Most times leaders do not see, or want to hear, the great lengths that maintenance personnel go to to keep their unit's equipment fully mission capable. If I had to calculate the man hours used in acquiring parts from "other" sources, I could easily figure a minimum of 5 to 6 hours a week for a battalion-size unit.

In the last 7 or 8 years, we have downsized and reduced the number of mechanics in the motorpool, but the operational tempo (OPTEMPO) has increased. We have increased the stockage criteria of the PLL and, in turn, reduced the number of repair parts we can maintain at the unit level. I guess it is a double-edged sword—we in the maintenance arena have fewer people, fewer available repair parts at our location, and an increased OPTEMPO, but we will be damned if we let our OR rate drop below 90 percent. By doing this, we are not giving the logistics decision makers an accurate picture.

Just because the numbers remain high does not mean the system is working. It may mean that we have been forced to find alternatives that not everyone will admit to.

CWO2 Al Smith
Camp Stanley, Korea

Rethinking Mechanic Recruitment

I read Major Diana Lizotte's article, "Training the Force XXI Multicapable Mechanic," in the November-December 1998 *Army Logistician*, with great interest.

Major Lizotte's reasoning is orderly, intuitive, ...and flawed. It is difficult to disagree with her admonition that the "Army should provide the right recruiting practices, training programs, and retention incentives." When she moves closer to specifics, her analysis becomes more tenuous.

Her prescription for ensuring that multicapable mechanics are highly trained, successful, and will stay in the service is fourfold: (1) higher wages or bonuses, (2) giving them tools to keep, (3) civilian accreditation for on-the-job training, and (4) promotion points when they attend advanced or technology training.

Regarding the first recommendation, there are abundant civilian employment opportunities for VOTEC-trained, highly-skilled, multicapable mechanics. Those jobs provide pay and benefits substantially exceeding anything the Army is likely to provide, and they have regular hours, geographic stability, and physical safety. Is it likely that the Department of Defense will support a compensation package that comes close to equaling those available in the civilian sector? If the experience of enlisted information systems personnel is instructive, the answer is "no." Consequently, mechanics are leaving the Services in droves.

The second and third recommendations are fatally flawed. Civilian accreditation and a free toolbox may be incentives for recruitment, but they are disincentives for retention. The cold, hard fact is that anything the Army does to make soldiers more marketable in a civilian career is an incentive to leave the Service.

When I served as an ARNG health services materiel officer, the Army was having an incredibly difficult time retaining enlisted advanced biomedical equipment repairers (BMER's). The BMER specialty was an easy one to recruit, with the incentive being train-

ing in a highly marketable civilian skill. The possibility of attendance at the 35U (advanced BMER) course was an effective retention tool. Concurrent with the advanced course diploma, however, graduates frequently received an invitation from a commercial firm for safe, stable, 40-hour-week employment paying in the neighborhood of $50,000 per year.

Among the hallmarks of the BMER retention problems were (1) a skill directly transferable to the civilian sector, (2) high demand in the civilian sector, and (3) a substantial difference between the military and civilian sector wages for the skill.

Major Lizotte's assumption that "improved recruiting practices" will reap the Army's requirement for multicapable mechanics is unsupported and questionable. Advocacy of actions that improve the marketability of Army mechanics in the civilian sector (accreditation and free toolboxes) is counterproductive.

I have no doubt that the Active Army can recruit for maintenance military occupational specialties (MOS's), *if* it offers training as the incentive for enlistment. However, retaining those soldiers, once trained, will be a challenge. Based on my 34 years of experience in the reserve component, I see attempting to access the required number of multicapable mechanics as being more traumatic for the reserves.

Recruiting will be difficult at best. If the target population is defined as trained, multicapable mechanics, the reserve component will be forced to fill its units' modification table of organization and equipment (MTOE) requirements from the limited VOTEC-trained mechanic population in a relatively small geographic area. That will be very difficult for many units. What are the incentives for a fully trained VOTEC graduate to enlist in the reserves? If income is the prospective soldier's goal, it can be maximized by working overtime in the civilian sector.

The recruiting problem can be overcome if the reserve component recruits untrained soldiers and pays for the VOTEC schooling to transform them into multicapable mechanics. Then, however, retention will be the challenge.

Clarence Darrow once observed, "History repeats itself; that's what's wrong with history." When reservists acquired MOS 35U, they no longer needed the reserves, and many seized the first opportunity to separate. Is there any reason the highly marketable multicapable mechanic will be different?

Multicapable mechanics will provide incredible sustainment capability and flexibility—if they can be recruited and retained in both the active and reserve components. If Major Lizotte's thinking mirrors Army planning for recruiting and retaining Force XXI maintenance soldiers, there is a lot of rethinking to be done.

Paul Krumhaus
Annandale, Virginia

New Bags, Old Concept?

I was interested to read that the Army finally is using bagged water [May-June 1999 issue, page 21. Also see July-August 1997 issue, page 40, for more information.], but I was a little nonplussed to discover that the article implies that this was a new idea.

I am a Latter-Day Saint (Mormon) and try to practice the Church's policy of maintaining a year's supply of food, water, clothing, and other essentials in case of disaster, job loss, or other emergency. Our family has been storing water in 6-gallon mylar bags in boxes for more than 12 years now. When I was a lieutenant, assigned to the 1-10 U.S. Cavalry, I suggested the use of the bags for water resupply since the bags are tough, reusable, and do not transmit odors or taste through the container. But, my suggestion was rejected as having "no merit" by the local suggestion review board.

And what about the existing technology by which milk is transported and stored for dining facilities? This method is even older than the mylar bags and appears to be effective, yet a "new" method was needed for transporting and storing water?

What concerns me is that we went out to a civilian company to "design" this "new" idea when there were companies mass-producing the bags already. Am I missing something in the acquisition process? I'm always ready to learn something new.

Major R. E. Lewis
Alexandria, Virginia

Log Notes provides a forum for sharing your comments, thoughts, and ideas with other readers of *Army Logistician*. If you would like to comment on an *Army Logistician* article, take issue with something we've published, or share an idea on how to do things better, consider writing a letter for publication in *Log Notes*. Your letter will be edited only to meet style and space constraints. All letters must be signed and include a return address. However, you may request that your name not be published. Mail letters to EDITOR ARMY LOGISTICIAN, ALMC, 2401 QUARTERS ROAD, FT LEE VA 23801-1705; send a FAX to (804) 765-4463 or DSN 539-4463; or send e-mail to alog@lee.army.mil.

ALOG NEWS

ARMY SUPPORTS OPERATION ALLIED FORCE

As of early May, the Army had deployed approximately 5,350 soldiers to Albania in support of Operation Allied Force—the NATO campaign to compel Yugoslav forces to withdraw from Kosovo.

The initial deployment of about 2,000 troops to create Task Force Hawk was drawn from units of V Corps in Germany. They included two AH-64 Apache attack helicopter battalions (a total of 24 helicopters), a multiple launch rocket system (MLRS) battalion (equipped with 18 launchers), a mechanized infantry company, a task force deep operations center, a general support aviation battalion (with about 26 UH-60 Black Hawk and CH-47 Chinook helicopters to provide utility and medical evacuation support), a support battalion, a military police company, a signal company, and transportation, maintenance, medical, administrative, explosive ordnance disposal, and other support elements.

☐ The first Apache helicopters arrived at Rinas Airport in Tirana, Albania, on 21 April.

Subsequent deployments included two light infantry companies and a battalion headquarters and headquarters company from the 505th Infantry Regiment, 11 Apache helicopter crews from the 229th Aviation Regiment, and logistics support personnel from the XVIII Airborne Corps, all from Fort Bragg, North Carolina; a light infantry company, MLRS platoon, antitank company, combat engineer platoon, Avenger air defense platoon, military intelligence platoon, military police platoon, and combat service support (CSS) team, all from the United States; and a brigade headquarters, mechanized infantry company, armor company, 155-millimeter artillery battery, MLRS battery (minus), combat engineer company, construction engineer company (minus), short-range air defense battery, smoke generator platoon, and CSS elements, all from U.S. Army, Europe. The Army also has sent two logistics support vessels from the 7th Transportation Group at Fort Eustis, Virginia, bringing, among other equipment, two rough-terrain container handlers.

In response to the President's call-up of reservists in late April, the Army will call up individual soldiers with needed specialties, not units. The call-up is for no more than 6,100 soldiers out of a total of 33,102.

At press time, the *Army Logistician* staff was notified that Major General Charles S. Mahan, Jr., had been nominated for promotion to lieutenant general and assignment as Army Deputy Chief of Staff for Logistics (DCSLOG). Lieutenant General John G. Coburn, former DCSLOG, has been promoted to the rank of General and is now Commander, Army Materiel Command. More information will follow in the September-October issue.

ADRIATIC SEA PORT OF ENTRY SAVES TIME

The port of Rijeka, Croatia, is the new entry point for U.S.-based equipment bound for Bosnia. Using this Adriatic Sea port saves 2 weeks in shipping time over a previous shipping route through Bremerhaven, Germany, to Hungary, and then to Bosnia. Also, helicopters shipped to Rijeka now have to travel a much shorter distance by air to reach Bosnia.

"Rijeka has met all our expectations," said Colonel Tom Thompson, commander of the 598th Transportation Brigade in Rotterdam, The Netherlands. "The port works real hard for us." MTMC planners say Rijeka is a good choice because of its ample docks and storage space and its availability for military shipping movements. It was first used by the Military Traffic Management Command last August to move the equipment of the 1st Brigade, 1st Cavalry Division. The Military Sealift Command's *USNS Soderman* transported the equipment from Beaumont, Texas, and Wilmington, North Carolina, to Rijeka.

(News continued on page 54)

NEWS

(News continued from page 1)

Future scheduled shipments include moving 10th Mountain Division (Light) Headquarters in July; returning 1st Cavalry Division Headquarters in August; moving 10th Mountain Division (Light) brigade in September; and returning 2d Brigade, 1st Cavalry Division, in October. (For more, see article on page 30.)

MULTICAPABLE ABRAMS AND BRADLEY MECHANICS START TRAINING

Transition training under the Army's new multicapable maintainer (MCM) program is scheduled to begin this year, starting with mechanics assigned to the 4th Infantry Division (Mechanized).

The purpose of the MCM program, according to Dr. Aileen Tobin, the Program Manager–MCM, "is to develop two, full-up MCM's—one for the Abrams tank [notional military occupational specialty (MOS) 63A] and one for the Bradley fighting vehicle [notional MOS 63M]—who can be relied upon to perform all current organizational and on-board direct support tasks for the M1 tanks and M2/3 fighting vehicles in Force XXI maneuver battalions." (The Total Army Personnel Command is staffing the MOS structure. Pending Department of the Army approval, the MCM MOS's will be established effective 1 October 2000.)

The new Abrams MCM's will take on all of the Abrams organizational tasks currently performed by the Abrams turret (MOS 45E) and hull (MOS 63E) mechanics, as well as the on-board direct support tasks now performed by the armament (MOS 45K) and track vehicle (MOS 63H) repairers. The new Bradley MCM's will assume all of the Bradley tasks currently assigned to the Bradley turret (MOS 45T) and hull (MOS 63T) mechanics, as well as the on-board direct support tasks now performed by the armament (MOS 45K) and track vehicle (MOS 63H) repairers.

Skill level 1 and 2 transition training will be conducted either at the Army Armor School at Fort Knox, Kentucky, or by using mobile training teams, while skill level 3 training will be conducted by mobile training teams or at regional training sites-maintenance. Reserve component units converting to Force XXI before fiscal year 2006 also are targeted to receive mobile training teams.

Resident training at the Armor School will be phased in as follows—

- Advanced individual training (AIT). February 2000: instructor certification. June 2000: first class starts. October 2000: first class graduates.
- Basic NCO course (BNCOC). January 1999: instructor certification. Third quarter, fiscal year 1999: first class graduates.
- Advanced NCO course (ANCOC). No change to the program of instruction.

The Abrams Tank System Maintainer course will be 15 weeks and 3 days long and will train 40 critical tasks to support the M1A1; an additional skill identifier (ASI) course will support the digitized M1A1D, M1A2, and M1A2 (Systems Enhancement Program) systems. The Bradley Fighting Vehicle System Maintainer course will last 13 weeks, 4 days, and will teach 20 critical tasks on the M2A2, M3A2, Bradley fire integration support team vehicle, and Bradley Stinger fighting vehicle (Linebacker) systems; an ASI course will focus on the M2A3 when it is fielded. All courses will incorporate organizational and on-board direct support tasks.

The MCM program is a cooperative effort between the Ordnance Corps and the Armor Corps. According to Major General Dennis K. Jackson, the Chief of Ordnance, "The goals of the program . . . are to combine unit and on-board direct support maintenance skills; align maintenance skills with technology; enable the force with the best tools and technology; and optimize capabilities and the impact on combat effectiveness."

TOBYHANNA PROVIDES RATIONS FOR BALKANS

In April, the Department of Defense (DOD) began airlifting humanitarian daily rations (HDR's) to the Kosovo Region to help relieve the growing refugee crisis in the Balkans. The flights were bound for Italy, where the supplies were transported to Albania to support Operation Sustained Hope. Each package of HDR's contains one day's complete food requirement for one person, according to Army Lieutenant General John M. McDuffie, Director for Logistics, J-4, the Joint Staff. The high-calorie, grain-based meals contain no meat, and are suitable for followers of all religions, he said. The Pentagon has distributed this type of humanitarian ration during relief operations around the world since 1993.

The first rations were transported from Defense Distribution Depot Tobyhanna (DDTP), a Defense Logistics Agency activity located at Tobyhanna Army Depot in Pennsylvania, to Dover Air Force Base, Delaware. There, 50,000 rations were loaded aboard an Air Force C–17 that departed for Italy on 3 April. An Air Force C–5 also took off for Europe bearing a 60,000-pound

loader, forklifts, and other cargo-handling equipment. A second C–17 carried an airlift control unit that would set up airport operations and manage air traffic control.

In addition to the 50,000 meals shipped on 3 April, DDTP personnel prepared and shipped an additional 450,000 meals to Dover Air Force Base over a 2-day period that included Easter Sunday. On the following Monday, DDTP was called on again to prepare and ship an additional 279,540 meals. This effort was coordinated by the Office of the Secretary of Defense through the U.S. Agency for International Development and the Office of Foreign Disaster Assistance. This shipment was flown out of John F. Kennedy International Airport in New York to Italy on a commercial-contract 747 aircraft and transferred to U.S. military aircraft for transport to the Balkans. U.S. European Command officials shipped U.S. military and Department of State trucks to Albania to help move supplies from ports and airports to the people who need them. U.S. military officials also delivered tents, sleeping bags, blankets, and cots to Macedonia.

General McDuffie stressed that DOD is playing a supporting role in the relief effort. The United Nations and non-Government agencies had already prepared for the possibility of a refugee crisis. The pre-positioned food in the area, he said, and OXFAM (Oxford Famine Relief, a British humanitarian organization) transported water purification and distribution equipment into the region.

☐ A mobile vehicle operator at Defense Distribution Depot Tobyhanna loads HDR's for shipment to Dover Air Force Base, Delaware.

DOD BUSINESS PRACTICE GOALS DEFINED

The Defense Systems Affordability Council (DSAC) has published "Into the 21st Century: A Strategy for Affordability," a document that defines the Department of Defense's (DOD's) business practice goals. The document will serve as a blueprint for using best business and technical practices to meet future defense needs.

The goals set forth in the document are—

- ***Field high-quality defense products quickly and support them responsively.*** Reducing the cycle times of DOD acquisition, logistics response, and repair processes will reduce costs and improve readiness.
- ***Lower the total ownership cost of defense products.*** Reducing the acquisition cost of new systems will increase the purchasing power of DOD modernization funding. Reducing operating and support costs of fielded systems will free more resources for modernization.
- ***Reduce the overhead cost of the acquisition and logistics infrastructure.*** Unused funds can be reallocated for modernization or support.

For each of the three goals, the document defines specific objectives and the major initiatives that will contribute to achieving those objectives. Objectives include reducing the average acquisition cycle time for all new systems by 50 percent; reducing logistics response time from an average of 36 days in fiscal year (FY) 1997 to 5 days by FY 2005; reducing the repair cycle time for end items and reparable parts by 25 percent by FY 2001 compared to an FY 1997 baseline; reducing the annual logistics support cost per weapon system by 20 percent by FY 2005 compared to an FY 1997 baseline; and reducing the funding for logistics and other infrastructure from 64 percent of DOD's total obligation authority in FY 1997 to 53 percent by FY 2005.

The DSAC is the senior DOD forum for developing strategies for acquiring affordable defense systems. It is chaired by the Under Secretary of Defense for Acquisition and Technology.

ARMY SEEKS FY 2001 SEP PROPOSALS

During June, July, and August, the Army is accepting new start candidates for the fiscal year (FY) 2001 Soldier Enhancement Program (SEP). The SEP is designed to enhance the survivability, lethality, mobility, command and control, and sustainability of soldiers in combat situations by speeding the process of adding commercial, off-the-shelf items to the Army inventory. SEP's goal is to begin fielding equipment within 3 years after it is adopted instead of the usual 7 to 10 years required to introduce a new item into the Army inventory.

"When soldiers get ready for the field, they end up going to Ranger Joe's, the Cavalry Store, or Brigade Quartermaster and spend their own money buying equipment to use in the field, and we don't want them to have to do that," says Ken Sutton, SEP manager. Such things as the mini mag flashlight, new menus for ready-to-eat meals, plastic handcuffs, and improved body armor are examples of items the SEP has introduced in the past.

The SEP is not an incentive award program. No monetary awards are given for proposals that are adopted

for use and result in a cost saving to the Government. Examples of SEP projects to start in FY 2000 include a joint service combat shotgun to be used in riot control and peacekeeping operations; a smart mine probe that helps soldiers distinguish between plastic, metal, and rocks during mine-clearing operations; a thermal cutting device that can cut through rebar, burglar bars, locks, and hinges quickly during military operations in urbanized terrains (MOUT); and a tactical assault ladder that allows soldiers to enter or exit a multistory building during MOUT operations.

Anyone who has an idea that will make soldiers' lives better is encouraged to send an e-mail to suttonk@benning.army.mil, send a fax to (706) 545–1377 or DSN 835–1377, or call (706) 545–6047 or DSN 835–6047.

OPERATIONS RESEARCH SYMPOSIUM SET

The 38th annual Army Operations Research Symposium (AORS) will be held on 19 and 20 October at Fort Lee, Virginia. Over 200 Government, academic, and industrial leaders are expected to participate.

The Army Materiel Systems Analysis Activity is sponsoring this year's event. Its theme is "Reshaping Army OR for the 21st Century Operational Challenge." The Army Combined Arms Support Command and the Army Logistics Management College will co-host the symposium.

General conference information can be obtained by visiting the AORS website, http://amsaa-web.arl.mil/aors, by sending an e-mail to AORS38@arl.mil, or by calling (410) 278–5358 or (410) 278–6614 (DSN prefix: 298).

WILDCAT PROGRAM MAKES SUPPLY SYSTEM PURR

Wildcat, an innovative supply-tracking program recently implemented at III Corps, Fort Hood, Texas, is improving materiel management by helping to track the issue, transport, and receipt of repair parts; provide cost reporting and performance metrics; and influence business process improvements. It augments the lateral distribution capabilities of the Army's automated logistics system, Standard Army Retail Supply System-Objective (SARSS–O).

Before SARSS-O, movement of class IX items such as engines, transmissions, generators, and nuts and bolts only could be tracked vertically within an installation. If a supply support activity on an Army installation had an excess part, it could not tell whether another supply activity on the same installation needed it. The inventory of each unit was essentially self-contained. SARSS–O now directs the lateral redistribution of that excess part from one activity to another. Wildcat provides intransit visibility to make sure the part gets to where it was intended.

When a materiel release order is issued directing an installation's excess supplies to another organization, the ordered parts are pulled and packed, and the shipment is given an identification number. After the lateral redistribution of the item is confirmed in SARSS–O, the parcel's three bar codes are scanned into the Wildcat system. The bar code data are transmitted via a commercial wireless communications network that sends data from point to point over the airwaves using handheld mobile Intermec computers that have a wireless, cellular phone-like capability. The computers have built-in scanning capabilities to gather data from bar codes on supply documents. Information is transmitted to a tower, which relays the information to the Wildcat server at the installation's distribution management center. A cellular computer software card about the size of a credit card fits into a slot on the handheld computers and permits captured data to be sent to a central data base.

Wildcat was named for the symbol of the Army Forces Command (FORSCOM) Materiel Management Center, which helped implement the program at Fort Hood. The Georgia Tech Research Institute, which provides research and development services to the Army, also played a major role in the Wildcat effort, including the software development. Intermec Technologies Corporation provided equipment for the system.

According to Oliver Thompson III, Wildcat program manager at FORSCOM, benefits so far are impressive. "For the first 9 months of fiscal year 1998, we estimate that referral savings netted [Fort Hood] about $3.4 million," he said. Fielding to other FORSCOM installations is scheduled to be completed during fiscal year 1999.

INTERNATIONAL SOLDIER SYSTEMS CONFERENCE SCHEDULED

The International Soldier Systems Conference '99 will be held 7 to 9 September in Orlando, Florida. The Army Soldier Systems Center in Natick, Massachusetts, and the Defence Clothing and Textile Agency in Colchester, England, will co-host this year's conference. Presentations and exhibits will focus on ongoing research and development programs and international soldier systems programs. The conference will incorporate the Army Soldier and Biological Chemical Command's Advanced Planning Briefing for Industry.

For further information, call (508) 223-4113 or e-mail smanoogi@natick-emh2.army.mil.

REFURBISHED HMMWV'S PROVIDE ADDED PROTECTION FOR BOSNIA TROOPS

About 550 high-mobility, multipurpose, wheeled vehicles (HMMWV's) are being refurbished, retrofitted, and modified to better withstand the blast of a land mine or other ordnance and potentially save the lives of U.S. soldiers serving in Bosnia.

Armored HMMWV's arrived in Bosnia in 1996. Now most of these road-worn vehicles need repair. The work force at the Kaiserslautern Industrial Center (KIC), near Kaiserslautern, Germany, has taken on the task of getting these vehicles back in shape and returned to Bosnia.

"It's a readiness issue and a protection issue for the soldiers," said Lieutenant Colonel Jim Drake, KIC commander. "Predominately these up-armored HMMWV's are being used in Bosnia and may potentially be used in Kosovo because they provide a higher level of protection for the soldier who's out on the front line."

The KIC refurbishment program has dual purposes. Vehicles that have been downrange and used heavily are being brought back up to standard. At the same time, 14 different modifications, such as new brakes, different axles, and suspension changes, are being made to better support the extra weight of the armor.

"In the end," Colonel Drake said, "we will be able to give the soldier on the front line in Bosnia better equipment and better protection should he need it. Hopefully the soldier won't, but that's the business that we are in."

About 25 HMMWV's already have begun the retrofit and refurbishment process. With the exception of a few minor parts shortages, the program has been running smoothly. The maintenance per vehicle requires about 350 man-hours of labor at a cost of approximately $23,000. Drake said programs like this will save the Army money down the road, because it is a lot cheaper to maintain a refurbished vehicle than one that has been driven into the ground.

DLIS PLANS WORKSHOP ON USING LOGISTICS INFORMATION

The Defense Logistics Information Service (DLIS) is hosting the 1999 Logistics Information Users Workshop 26 to 30 July in Battle Creek, Michigan. The workshop theme, "Working Together—Providing Premier Logistics Information," focuses on the importance of creating a synergistic approach to logistics issues.

For further information, call the DLIS Customer Support Center at DSN 932-4725, 1-888-352-9333, (616) 961-4725; send e-mail to dlis-support@dlis.dla.mil; or visit the DLIS website at http://www.dlis.dla.mil.

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Bulk Fuel Support In Bosnia

by Major Shawn P. Walsh

The United States provides fuel to many of the countries participating in the Stabilization Force. The Defense Energy Support Center, the mission proponent, is meeting the challenges of this unprecedented operation.

Since February 1996, the Defense Energy Support Center (DESC) has executed an unprecedented role specialist nation (RSN) mission for the United States in support of North Atlantic Treaty Organization (NATO) operations in Bosnia. In conjunction with its subordinate field office, Defense Fuel Office-Balkans, DESC has supported bulk fuel requirements for 14 Stabilization Force (SFOR) nations. The nations contributing troops to SFOR, formerly known as IFOR (Implementation Force), are participating in the implementation of the 1995 Dayton Peace Accords among Bosnia-Herzegovina, Croatia, and the Federal Republic of Yugoslavia. There have been many unique challenges since DESC assumed the RSN mission for the United States, and there is much to learn from this experience about RSN support of future NATO and multinational operations.

Role Specialist Nation Mission

In October 1995, the Supreme Headquarters Allied Powers Europe (SHAPE) requested that NATO assign to the United States the RSN mission for fuel support of the impending multinational military IFOR. The Joint Chiefs of Staff accepted the mission for the United States and, on 8 December 1995, directed the Defense Fuel Supply Center (now called the Defense Energy Support Center) to perform the RSN mission.

The NATO Logistics Handbook, dated October 1997, defines role specialist nation logistics support as: "One nation assumes the responsibility for procuring a particular class of supply or service for all or part of the multinational force. This should always be considered if one participating nation has a particular and unique logistic strength and capability for common supplies and services." For IFOR and SFOR fuel support, the United States has this particular strength and capability through DESC. DESC's worldwide mission is "to provide the Department of Defense and other government agencies with comprehensive energy support in the most effective and economical manner possible."

The bulk fuel RSN concept for IFOR was developed to limit competition among deployed national forces for scarce fuel resources. By having the United States provide bulk fuel support to all or part of IFOR, economies of scale could be achieved. Having just one nation purchase and coordinate fuel support would economize on the use of contracted resources.

DESC was not prepared to provide immediate fuel support to troop-contributing nations at the beginning of IFOR operations in mid-December 1995. It first had to determine how to support multinational fuel requirements and how the nations participating in the RSN program would pay for the fuel. Since there was an overlap of IFOR and United Nations Protection Force (UNPROFOR) operations in Croatia and Bosnia, the United Nations supported IFOR's fuel requirements until the end of UNPROFOR operations in March 1996. While the UN provided support, DESC professionals quickly worked to establish a forward office, determine RSN procedures, gather customer requirements, solicit

☐ **A contractor delivers fuel to the U.S. Army fuel point at Taszar, Hungary.**

and award fuel contracts to local sources, and determine a fuel reference price to charge the nations participating in the RSN program. The first shipment of DESC-contracted fuel to a foreign RSN customer was in February 1996 at $.98 per gallon.

Defense Fuel Office-Balkans

To support and manage day-to-day RSN operations directly, DESC and its Defense Energy Region Europe established the Defense Fuel Office-Balkans (DFO–B) in February 1996. DFO–B currently is located at Divulje Barracks, Croatia, close to the Adriatic port city of Split. Many of the national support elements of the countries participating in the RSN program are located at Divulje Barracks.

The mission of DFO–B is to provide bulk fuel to customers as far forward as contract support allows and to ensure that the fuel arrives at the right place, in the right quantity, and on time. DFO–B coordinates fuel support to meet requirements of SFOR customer organizations operating in Croatia, Bosnia, and Hungary. It receives bulk fuel requests from customer nations; places orders with contractors for product delivery; ensures that required receiving reports, customer invoices, and historical data are completed and distributed; manages documentation to ensure timely payments to contractors; and troubleshoots problems. Additionally, DFO–B coordinates transportation of fuel by truck when required and also has a limited quality assurance mission in conjunction with the Defense Contract Management Command (DCMC).

DFO–B's presence has contributed greatly to the success of DESC in performing the RSN mission. The DFO-B location at Divulje Barracks allows for direct communication with most customer national support elements. This is important since English is the national language of only 3 of the 14 customer nations, and many of the non-English-speaking customer nations come into the office to submit fuel requests. The face-to-face communication with customers eases language barriers, fosters a better understanding of any unique customer requirements or petroleum support equipment, and allows for detailed coordination. The result is satisfied customers who receive the right quantity of fuel on time and at the right location.

Supported Nations

While DESC was coordinating the RSN mission, the U.S. Office of the Secretary of Defense directed that DESC not pre-finance any fuel purchased for IFOR. This ensured that there would be no exception to the Federal Acquisition Regulations, which prohibit contracting officers from purchasing products for foreign countries using U.S. funding. The result was the establishment of foreign military sales (FMS) cases as the funding mechanism for nations participating in the RSN program. Each participating nation deposits money in its FMS account, allowing DESC to purchase fuel for that FMS customer.

☐ Coyote Station, near Tuzla, Bosnia, receives fuel delivery.

The 14 nations that DESC has supported in the RSN program are Austria, Belgium, Canada, the Czech Republic, Egypt, Germany, Greece, Luxembourg, Malaysia, The Netherlands, Norway (representing the eight countries of the Nordic Brigade), Turkey, the United Kingdom, and the United States. Although there are other troop-contributing nations in SFOR, some chose not to participate in the RSN program.

Fuel Requirements

Currently, DESC has contracts with fuel companies in Hungary and Croatia to provide one or more fuels to meet the requirements of nations participating in the RSN program. Current DESC contracts support the multinational requirements of Jet A-1, JP8, winter- and summer-grade diesel, leaded and unleaded motor gasoline (MOGAS), kerosene, and aviation gasoline (AVGAS). U.S. SFOR operations require six of these products.

In a theater where the production capabilities or infrastructure may not exist to support a variety of fuel requirements, military logisticians must plan for the single fuel of choice—JP8. This means logisticians must plan for equipment that burns JP8 only, contracts must be written for contractor support equipment that burns JP8, and space heaters with flues or other JP8-burning heaters must be used to heat tents.

Although JP8 is the single fuel of choice for the U.S. military, JP8 normally is not available from commercial sources, nor do foreign contractors typically possess injection equipment required to convert Jet A-1 to JP8. To support SFOR operations with JP8, DESC and DCMC face additional challenges. The contractors supporting SFOR operations provide Jet A-1 and convert it to JP8 using an injection system and additives—fuel system icing inhibitor, corrosion inhibitor, and antistatic additive—provided by the United States. This process requires the presence of DCMC quality assurance representatives to ensure that the additive injection system injects the Jet A-1 with the proper amounts of additives needed to deliver on-specification JP8 to customer units. Additive quantities at each loading site are closely managed, since the U.S. Government (DESC) is responsible for providing and transporting the additives to the contractors.

At the beginning of IFOR operations, JP8 represented the majority of fuel shipments to U.S. forces in Bosnia. Currently, seasonal diesel fuels represent the greatest quantity of fuel consumed in support of U.S. Army SFOR operations. U.S. Army ground equipment and aviation assets continue to use JP8. However, as a cost-saving measure, the Army is providing Government-furnished diesel fuel to its contingency support contractor in Bosnia, Croatia, and Hungary. The support contractor is using diesel fuel to run generators, commercial vehicles, and construction equipment.

In addition to summer- and winter-grade diesel and JP8, U.S. fuel requirements also include AVGAS for the Air Force Predator, an unmanned reconnaissance aircraft; MOGAS for nontactical vehicles; and kerosene for heating. The Army needs kerosene for flueless space heaters in tents. With a lower sulfur content than jet fuel and negligible amounts of the additives commonly found in jet fuel, kerosene is the cleanest fuel to burn in flueless heaters and the safest fuel for soldier health.

Joint Publication 4-03, Joint Bulk Petroleum Doctrine, states that "...any viable bulk petroleum support concept must incorporate the principles of standardization, flexibility, and interoperability." To promote standardization, the publication further states, "DOD components should minimize the number of bulk petroleum products that must be stocked and distributed, plan to use fuels readily available worldwide, and minimize the military-unique characteristics of DOD fuels. The determination of required fuel depends on the types of equipment deployed and must take into account the maturity of the theater's petroleum production and distribution infrastructure."

Since the beginning of IFOR operations, DESC has learned much about the theater's petroleum production capabilities and how contractors conduct business. Consequently, contract competition has increased, and so has DESC's position in negotiating contracts. The result is that DESC is able to meet all fuel requirements at economical prices and ensure that contractors provide efficient support. FMS countries now pay a reference price of $0.80 per gallon, while the U.S. military pays the DESC standard price for fuels received.

Theater Infrastructure

The theater distribution infrastructure also has improved as the result of continued SFOR operations. When IFOR deployed, the only means of delivering fuel to the U.S. Army in Bosnia was across the Army's pontoon bridge over the Sava River. Today, the pontoon bridge has been replaced by two war-damaged bridges that have been repaired. Furthermore, there is now rail transportation from outside Bosnia into Tuzla, which was impossible 3 years ago due to destroyed bridges. Because of the improved infrastructure, truck companies are interested in transporting fuel, and transporting fuel to Tuzla by rail is now possible.

Theater petroleum production and improvements in the infrastructure have enabled DESC to meet all fuel requirements of nations participating in the RSN program. However, this level of support also has meant greater challenges for supporting agencies such as DESC, DCMC, and the contractors, as well as the customers. Different products require different product procurement specifications, more refining sources, more quality assurance representatives at more locations, detailed distribution systems, greater contractor or military transportation requirements, segregated trucks, and smaller convoys that are required more often. Furthermore, customers such as the U.S. Army require more storage on the ground to hold different products.

Publications

DESC execution of the U.S. RSN mission for implementing the Dayton Peace Accords is an unprecedented event. DESC has had to make decisions concerning RSN responsibilities, techniques, procedures, and support concepts since there are few U.S. military or NATO publications specifically addressing RSN operations.

As of the writing of this article, Joint Publications 3-16, Joint Doctrine for Multinational Operations, and 4-08, Joint Doctrine for Multinational Logistics, were still in development. Some U.S. publications contain varying amounts of information on multinational combat service support planning. These publications include FM 100-8, The Army in Multinational Operations; Joint Publication 3-07, Joint Doctrine for Military Operations Other Than War; and Joint Publication 4-03.

NATO publications that mention RSN logistics support include the NATO Logistics Handbook and the Military Decision on MC 319/1, NATO Principles and Policies for Logistics. A draft of NATO AJP-4, Allied Joint Logistic Doctrine, currently is being coordinated.

As of 1 January 1999, DESC had provided over 80 million gallons of fuel to multinational SFOR organizations in Hungary, Croatia, and Bosnia. While performing this mission for the United States, DESC has learned lessons in multinational support and in dealing with contractors in the area of operations. The result is that DESC is able to support and deliver all bulk fuel requirements to customer organizations. Although this capability exists for this particular RSN mission, it may not exist for future multinational operations. Just as the RSN support concept has evolved over the past few years, RSN responsibilities, techniques, and procedures must evolve as U.S. and NATO multinational doctrine emerges. **ALOG**

Editor's note: Since this article was written, the Defense Energy Region Europe was renamed Defense Energy Support Center-Europe, the Defense Fuel Office-Balkans was renamed Defense Energy Support Center-Split, and the Defense Energy Office-Central Europe was renamed Defense Energy Support Center-Miesau.

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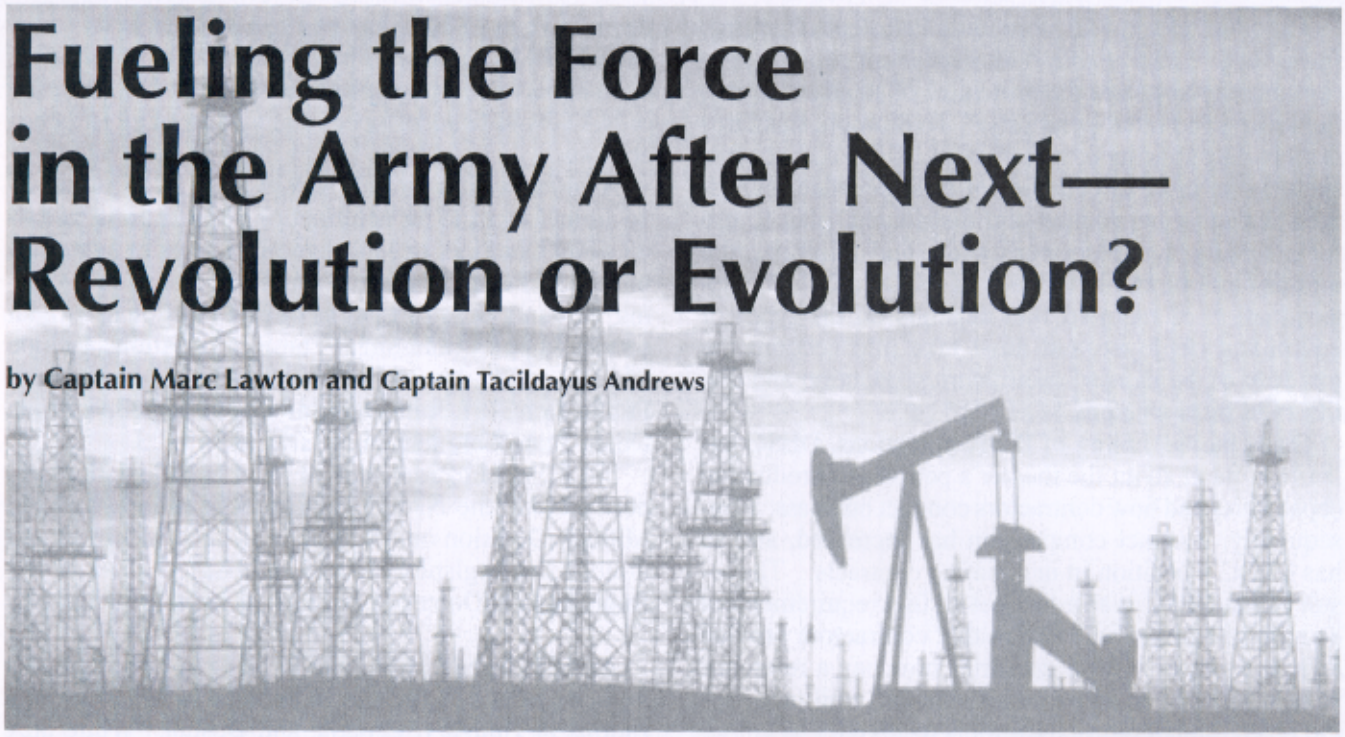
Fueling the Force in the Army After Next—Revolution or Evolution?

by Captain Marc Lawton and Captain Tacildayus Andrews



Today's Army is heavily dependent on oil and its byproducts as the primary fuel for the force. Yet oil reserves are limited. Current predictions indicate that the decline of oil reserves will coincide with the timeline for implementing Army After Next (AAN) technologies. AAN plans for the year 2025 and beyond call for a more fuel-efficient Army—in particular, making fossil fuel powered vehicles up to 75 percent more efficient. Unfortunately, little or no effort is being directed toward developing and using alternative energy sources. This is a shortsighted plan that leaves the Army vulnerable to another 1970's-like oil crisis. Now is the time to pursue a *revolution* in technology rather than merely accepting the currently proposed *evolution* in technology. Logic and national security concerns mandate a complete break from fossil fuel dependence. One such revolutionary change is the use of hydrogen—a resource that no country or organization can monopolize—as a fuel.

Oil in Decline

Research into alternatives to fossil fuels began during the 1970's, when members of the Organization of Petroleum Exporting Countries (OPEC) set limitations on the amount of crude oil provided to the industrialized world. Germany, Japan, and the United States—the three most powerful economies in the world at the time—bowed to a few countries whose only weapon was control of the world's oil production. These events crystallized energy supply as a strategic policy issue.

Realizing the magnitude of the threat to our economy and national security, the Carter administration initiated many incentive programs to promote research and development of alternative forms of energy that would free the United States from its dependence on high-priced foreign oil. Significant progress was made in several areas. A cost-benefit analysis comparing fossil fuels and alternative energies showed the latter to be economically attractive. However, by the mid-1980's, oil discoveries, increased production by non-OPEC countries, and price wars among OPEC countries forced prices down. As oil prices dropped and the Reagan administration drastically cut funding, alternate energy initiatives slowed dramatically. But the problem remains: regardless of price, oil supplies are finite and running out quickly.

Many oil industry experts see no reason for concern about a lack of oil in the near term. They report 1,020 billion barrels of oil in "proved" reserves as of the beginning of 1998. The current production rate is 23.6 billion barrels of oil per year. This suggests that crude oil may remain abundant and inexpensive for the next 43 years. This report, however, rests on three poor assumptions. First, it relies on a distorted estimate of the remaining oil; second, it assumes that oil production will remain constant; and third, it presumes that the last barrel drawn from a well is as easy and cheap to extract as the first.

Many conservative estimates indicate that conventional oil supplies will not be able to keep up with production demands through the next decade, and certainly

not past the year 2020. The point at which the supply begins to diminish is much more important economically than when the wells run completely dry. The fundamental law of supply and demand will take effect. When the supplies begin to decline, the prices will rise commensurately—this time for real. No artificial price hikes will be involved like those in the 1970's.

The first poor assumption made by the oil industry is their estimate of the reserves and the oil left to be discovered. Calculating the amount of oil left in an oil well is not an exact science; it is a bit of a statistical guessing game. Since it is possible in these guessing games to "work the numbers" in different ways, it is in the oil companies' best interests to work them so that oil reserves come out looking abundant. Thus, they predict 43 years of cheap supply.

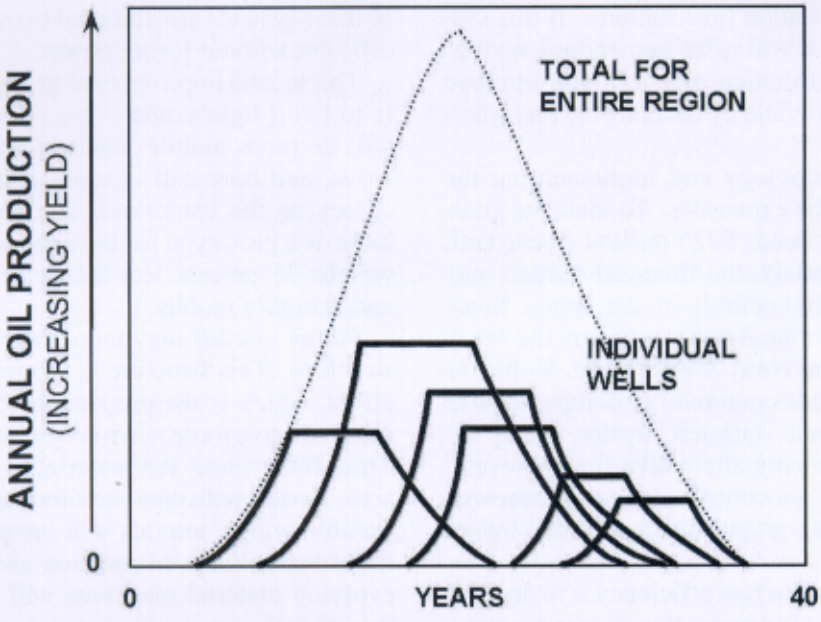
M. King Hubbert, a geologist working for Shell Oil, developed what is known as the Hubbert curve to predict the amount of oil remaining in oil wells. He used this curve in 1956 to correctly predict that oil production in the lower 48 states would peak around 1969. The chart below illustrates how a Hubbert curve works. The flat-topped curves represent oil production in individual wells. Their output rises to a certain level and remains constant for some time. Eventually, their supply begins to top out, and the curve falls back toward zero. The bell-shaped curve is a compilation of the individual wells. One can use it to determine how long the oil supply should last in a given region.

The chart on page 10 plots some Hubbert curves for various regions around the world and one for the entire world. Oil production in the United States and Canada peaked in 1972 and has dropped 45 percent in the former Soviet Union since 1987. A crest in the oil produced outside the Persian Gulf region now appears imminent. One can also see from this graph that the world's production of oil may crest around 2004, and that by the Army After Next timeframe of 2025, it definitely will be on the decline.

The second assumption made by the oil companies is that oil production will remain constant. This is not likely. The global demand for oil currently is rising at 2 percent per year. Since 1985, energy use is up 30 percent in Latin America, 40 percent in Africa, and 50 percent in Asia. The Energy Information Administration forecasts that worldwide demand for oil will increase to about 40 billion barrels of oil per year by the year 2020.

Finally, the third assumption—that the rate at which barrels of oil are extracted from a well will remain constant—is simply not true. As shown in the chart below, oil production in a well always rises to a maximum; when about half of the oil is gone, output begins to taper back down to zero.

So, although the world will not be out of oil by the year 2020, production will most likely be on the decline, and prices will be rising steadily. Because the Army is so dependent on crude oil for its fuel supply, the AAN planners are looking into the future to deal with the problems of diminishing oil reserves. What, specifically, are they looking at to alleviate these problems? Is it enough?

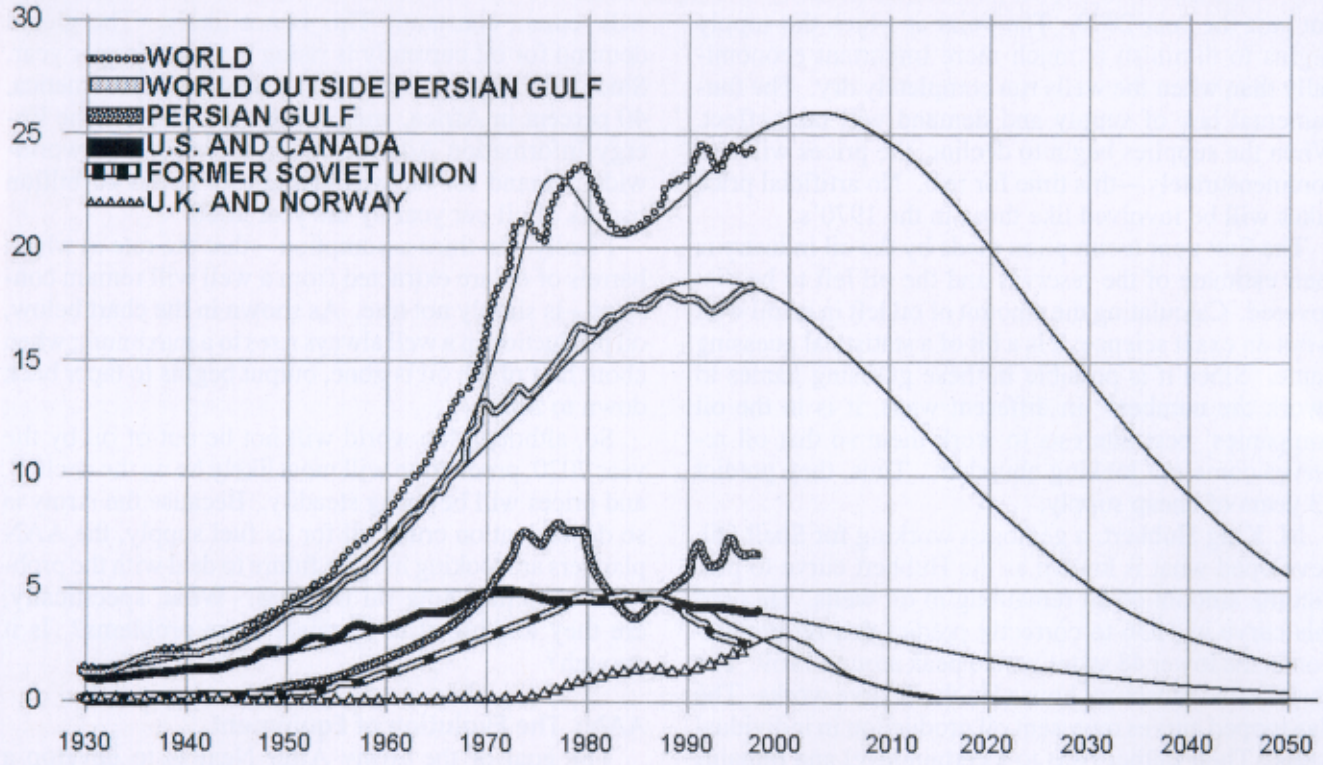


☐ The Hubbert curve is used to predict the amount of oil remaining in oil wells.

AAN: The Evolution of Equipment

The goal of the Army After Next is to develop a "highly mobile, high-speed insertion force." To achieve this goal, the AAN technological focus is on increasing fuel efficiency by reducing dependence on fossil fuel by 75 percent. Armor and aviation are the major fuel users. Therefore, AAN technology is centered on improving the fuel efficiency of armor and aviation systems. It takes approximately 565,000 gallons per day to fuel a ground armor division and 350,000 gallons per day to fuel an air assault division. Two improvements identified to reduce fuel consumption are the development of better, fuel-efficient propulsion engines and lighter platform, or structure, designs.

Along with developing technology to make systems "go the extra mile," the AAN plans to develop new methods for distributing fuel on the battlefield. The present fuel distribution system is not very fuel efficient. For example, a CH-47D Chinook



☐ The Hubbert curve for world oil production indicates that world oil production will begin to decline around 2005.

helicopter consumes 130,000 gallons of fuel in its effort to refuel the force with 200,000 gallons.

AAN planners propose a distribution method called the Remote Energy Replenishment System. This system is based on a "Star Wars" concept in which energy is beamed from a satellite and converted to fuel at a ground replenishment station (gas station). If this system can be developed, it will offer tremendous savings in the Army's fuel distribution practices and improve effectiveness on the battlefield by beaming the fuel wherever it is needed.

Developing the technology and implementing the ideas of the AAN will be expensive. To meet the goals of the AAN, the Army needs $225 million a year until the year 2015. Fortunately, the financial burden may not have to be shouldered entirely by the Army. Since fuel efficiency is not just the Army's problem, the Army joined Partners With Next Generation Vehicles (PANGV), which includes automotive companies like General Motors, Ford, and DaimlerChrysler, to help develop methods for financing alternative fuels. Several major universities also are contributing to the research and development of better propulsion systems and lighter platforms.

The first improvement to fuel efficiency is to develop new propulsion systems (engines) that do not require a substantial amount of fuel. One of the most promising propulsion systems, which is used mainly for aircraft engines, is the integrated high-performance turbine engine technology. Two other noteworthy systems are advanced turbine cycles and advanced diesel cycles that use smaller, lightweight engines. Another design is the advanced power transmission, which provides a drive train that is 40 percent lighter and makes less noise. All of these systems are designed to make engines more fuel efficient without losing power.

The second improvement to improved fuel efficiency is to build lighter platforms. The proposed platforms will be more mobile, ballistic resistant, and data sensitive, and they will increase maneuverability and accuracy on the battlefield. The composite armored vehicle is a prototype for the new material technology. It weighs 35 percent less than current armored vehicles and is highly mobile.

Future aircraft may incorporate an active/intelligent structure. This structure is formed by the piezoelectric effect, which is the property of crystals to develop an electromotive force when subjected to mechanical strain. This effect causes the material to expand or contract in size. Armed with data-sensitive sensors, elasticity, and flexible wings, aircraft will have less drag and better flight control and information awareness. Lighter and evolving material platforms will reduce the consumption of fuel.

The AAN planners believe that better propulsion systems and lighter platform materials will reduce fuel us-

age by 75 percent. In an armored division, combat vehicles will require 72,000 gallons per day as compared to the 288,000 that they presently require, and they will move faster on the battlefield. Aircraft will require 14,000 gallons per day as compared to 55,000 and will travel farther and more quietly.

However, the AAN plan is based on a diminishing fuel supply. At the scheduled implementation date (the year 2025), the price for fossil fuels will be rising and the fuels will be running out. The Army is not devoting enough money and other resources toward revolutionary new systems. What are some of the alternatives that could be considered?

Emerging Technologies

Possibly the most familiar application of alternate energy is the solar water-heaters found on many residential roofs in Southern States. The Army already has made good use of direct solar energy through installation-wide solar water-heating projects. It also has retrofitted gyms and older installation housing with solar water heaters; new housing routinely includes solar water heaters.

Solar energy currently has no viable technological application for vehicle propulsion except through the use of photovoltaic cells, which convert solar radiation into electrical energy that is then stored in batteries. These systems are currently impractical for military vehicle applications due to the low conversion efficiency of photovoltaic cells and the limited storage capacity of batteries. In addition, these systems' dependence on clear skies is unacceptable.

Current vehicle designs rely on at least one battery for their operation. Inspired by environmental concerns, researchers continue work on vehicles that operate exclusively on electricity stored in batteries. Technological advances have produced lighter automotive batteries with greater storage capacity. Unfortunately, battery-powered cars still have two serious drawbacks: battery disposal and the need for recharging. All of the components of current batteries are environmentally unfriendly and have to be handled with caution. Vehicle batteries also currently need at least 4 hours to recharge from an external source—not long for a commuter car but an eternity for a combat vehicle.

One promising alternative to our oil dependence is natural gas. Internal combustion engines can be converted to run on natural gas in less than a day. The natural gas distribution infrastructure is already in place. Expanding that infrastructure to supplement, and ultimately replace, oil-based fuel delivery systems (gas stations) would be uncomplicated. As a result, conversion to natural gas-powered vehicles is a viable short-term solution to our oil dependence. While continuing our dependence on fossil fuels, the existence of extensive U.S. natural gas reserves will buy time for development of nonfossil fuel systems.

Hydrogen As a Fuel

Hydrogen, one of the least-pursued alternatives of the 1970's research flurry, appears to be the most promising fuel for the AAN. It is abundant, infinitely renewable, and environmentally friendly. It is a natural byproduct of many chemical processes, ranging from electrolysis of water to decomposition of solid municipal waste. It can be produced using electricity generated by solar, wind, or conventional sources. This allows the generation of hydrogen to be independent of any geographic location or natural resource.

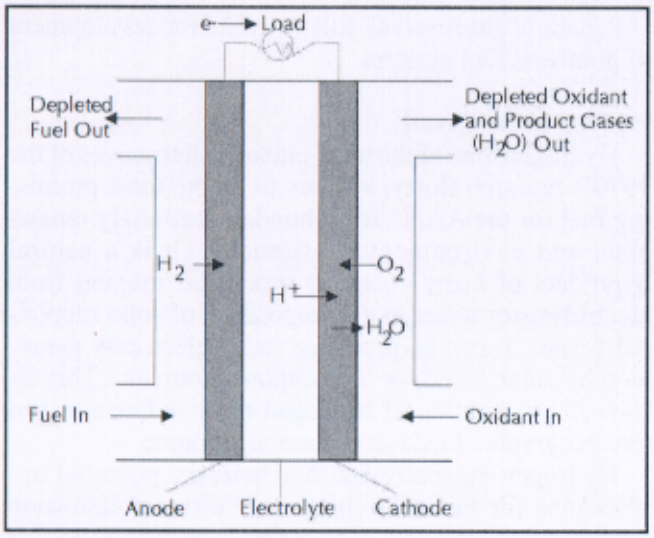
Hydrogen currently has two primary potential applications for tactical vehicle use: direct combustion engines and fuel cells. A hydrogen combustion engine weighing 220 pounds has been built by a retired aircraft tooling designer. It produces 300 horsepower and 800 foot-pounds of torque. The 6.2-liter HMMWV (high-mobility, multipurpose, wheeled vehicle) engine, by comparison, weighs 650 pounds and is rated at 150 horsepower and 260 foot-pounds of torque. The hydrogen engine is obviously superior, and it already exists. In an operation similar to the simple conversions required to burn natural gas, today's internal combustion engines require relatively minor adjustments to burn hydrogen. Hydrogen burns completely emission free, making it the perfect, environmentally friendly fuel.

Fuel cells, an emerging technology, also make hydrogen an attractive alternative. They were used on Gemini, Apollo, and Space Shuttle missions, producing electricity from hydrogen with pure water and heat as the only byproducts. A fuel cell is a device that converts chemical energy directly into electricity. It works like this: two gases (in this case hydrogen and oxygen) are placed on either side of an electrolyte. The hydrogen molecules split into atoms, lose their electrons, pass through the electrolyte, and bond with the oxygen to form water. The loose electrons flow from anode to cathode, producing an electrical current as demonstrated in the diagram on page 12.

This process has only two byproducts, steam and heat. The steam can be captured and condensed into pure water for human consumption on the battlefield. Current fuel cells operate at temperatures as low as 150 degrees Fahrenheit and have the potential to produce no heat signature. When hydrogen is split, the conversion to water occurs naturally and the environment is not harmed.

Drawbacks of Hydrogen

The use of hydrogen does present some difficulties. The first and most obvious is its volatility. This can be overcome by using new material technology to increase ballistic resistance, and systems can be redesigned to



☐ The hydrogen fuel cell produces environmentally safe byproducts of steam and heat.

compensate for incoming fire and operational turbulence. This should limit the adverse effects of the innate explosiveness of hydrogen. While highly combustible, hydrogen is also very light. This allows it to dissipate into the air before it burns. As an example, there were no casualties due to burning in the Hindenburg disaster; rather, people died from the fall.

The second drawback to using hydrogen is poor fuel-cell efficiency and the resulting requirement for large storage tanks. Recent technological advances have increased fuel-cell efficiency to 50 percent, up to three times the efficiency of a gasoline combustion engine. This increased efficiency will reduce the storage requirements. General Motors has developed a plan for a civilian vehicle that will have an exceptional fuel economy of 80 miles per gallon (mpg). Recent improvements in material technology have increased average storage capacity to 10 gallons, which, coupled with the 80 mpg from the General Motors vehicle, gives hydrogen vehicles a potential range of 800 miles. Given proper research funding, efficiency can be further increased, thereby reducing the fuel storage requirements of hydrogen-powered vehicles.

With only minimal funding—the Department of Energy allots only 1/90th of its annual budget for hydrogen research—scientists in the automotive industry, the Federal Government, and backyard inventors have made major advances in hydrogen applications. Unfortunately, their efforts are isolated from one another and lack coordination. The Federal Government is the logical organization to unify hydrogen research and develop a clearinghouse for funding and information exchange.

The AAN plan is to increase fuel efficiency of the current fossil fuel-based engines by developing better engines and lighter vehicle platforms. Given projections of declining oil reserves coinciding with implementation of AAN technologies, it is short-sighted strategic policy to continue our reliance on fossil fuels. Even if these predictions are 5 or 10 years premature, we still face the prospect of having vehicles that depend on a diminishing fuel source. This policy would leave the United States vulnerable to countries that control petroleum production. This also forces the United States to make protection of petroleum resources a national security issue. Few would argue that protection of this resource was the strategic objective of Operation Desert Storm.

Hydrogen is the fuel for the revolutionary family of combat vehicles that AAN planners must develop. It is abundant, easily adapted for energy production, environmentally friendly, and has tactical advantages over petroleum-based fuels. Its unlimited availability would eliminate the prospect of the United States having to face another fuel crisis. The abundance of hydrogen in the world also would end the economic and strategic influence that oil-producing countries currently have over the United States and the rest of the world. Without these external influences, the protection of our fuel supply no longer would need to be a national security priority. For these reasons, development of hydrogen-based vehicles is a national imperative. **ALOG**

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The authors would like to thank Captains Jeffrey Douds, Tyson Garren, and Francisco Moreno for their assistance in preparing this article.

Protection From Chemical and Biological Threats

by Sarah A. Morgan-Clyborne, Frank J. Cole, and Matthew R. Whipple

Soldiers and others in counterterrorism and emergency response operations involving unexploded chemical and biological weapons and toxic industrial chemicals need the best personal protection available. In response to that requirement, the Army Soldier and Biological Chemical Command (SBCCOM) has developed a suit that will protect Army explosive ordnance disposal (EOD), technical escort unit, chemical activity, and depot personnel from all known toxic chemical and biological warfare agents, as well as industrial chemicals, oxidizers, and rocket fuels.

The self-contained toxic environment protective outfit (STEPO) was developed under the management of Project Manager (PM)-Soldier at Fort Belvoir, Virginia. It is rated "Level A" by the Occupational Safety and Health Administration and the Environmental Protection Agency, which means it is suitable for use when the greatest level of skin, respiratory, and eye protection is required.

The STEPO will provide up to 4 hours of skin and respiratory protection to workers operating in chemical warfare agent environments. The outfit will be worn while storing and disposing of chemical and biological weapons in combat and peacetime industrial environments. The STEPO system also will be worn during the handling and operation of large rockets and guided missiles that use exotic fuels and oxidizers.

Modular Design

Four components combine to make up STEPO: a chemical protective suit, two separate types of breathing systems, a personal ice cooling system, and a communication system. The STEPO system can be used in three different modes of operation, depending upon the configuration of the following components—

Chemical protective suit. The suit is a totally encapsulating one-piece garment with integral booties, airtight slide closure, and glove assembly. The suit fabric is made of five alternating layers of Nomex® and Teflon®. The fabric has a middle layer of fluoropolymer that, when exposed, indicates wear. The material provides up to 4 hours of protection against chemical warfare agents, industrial chemicals, petroleum, oils, and lubricants. The material dissipates static, is self-extinguishing and flame resistant, and has a lower solar load because of its light gray color. The gloves are made of viton and butyl rubber. An optional glove liner made of Silvershield™ can be worn also. A large visor made from fluorinated ethylene propylene has been incorporated into the head cover portion of the suit to provide a wide field of vision. The visor has an antifog layer laminated on the inside to prevent fog from forming and obstructing the user's view.

Breathing systems. One of two types of breathing systems is used with the STEPO—

- The rebreather is a modified version of the commercially available National Institute for Occupational Safety and Health (NIOSH)-approved Biomarine™ Biopak 240 self-contained breathing apparatus. The rebreather is a closed-circuit breathing system, which is worn under the STEPO suit. It circulates exhaled air through a scrubber that absorbs the carbon dioxide. The effluent then is mixed with an oxygen stream supplied from a compressed oxygen bottle and is reintroduced into the respirator face-piece, where it is inhaled. Together, the rebreather and its oxygen bottle weigh approximately 35 pounds and can provide a 4-hour air supply.
- The Interspiro™ self-contained breathing apparatus (I-SCBA) was approved by NIOSH and currently is being used by Army and Air Force firefighters. It consists of a 1-hour air cylinder for stand-alone SCBA operation or a 30-minute air cylinder for tether operation. Other components of the I-SCBA include a breathing valve, a

pressure gauge, a connective hose and tubing, a shoulder harness, and a waist belt. The I-SCBA is worn under the STEPO suit and weighs approximately 35 pounds. The I-SCBA, with the 1-hour air cylinder, is used as an alternative to the rebreather when a 1-hour air supply is sufficient. The I-SCBA also can be used with a tether air line, which is connected to an external air source to supply air for breathing. When used in the tether operation mode, the I-SCBA is equipped with a 30-minute air bottle, auto-shuttle valve, and encapsulating suit passthrough. The auto-shuttle valve automatically switches from the tethered air source to the 30-minute air cylinder if the tethered air source is disconnected, depleted, or interrupted.

Personal ice cooling system (PICS). PICS removes metabolic heat from the body, allowing the user to work in the STEPO suit with a reduced risk of heat stress. The PICS consists of a pump unit, a plastic bottle, a connective hose and tubing, a suit passthrough, and a shirt with tubing running throughout. The PICS unit is a closed-loop system that uses ice water as a coolant. The ice water is circulated through the tubing in the shirt. The PICS provides approximately 30 minutes of cooling, depending on the air temperature and individual comfort levels. It can be used for longer periods if the ice bottle is replaced periodically. The system requires three D-cell batteries to operate, and it weighs approximately 15 pounds fully charged, including the cooling shirt. The cooling shirt is available in four sizes (small, medium, large, and extra large).

Communication system (CS). The CS allows users to communicate with each other as well as with the command center. The CS has two variations. The variant used when the STEPO system is configured with a rebreather consists of commercial electronic products, including a soldier intercom, an ear microphone, and a push-to-talk body switch with voice-activated capability. The variant used when the STEPO system is configured with the I-SCBA consists of radio and interface equipment currently used by Army chemical activities and depots and technical escort units.

Development Process

Development of the STEPO system was an iterative process. An initial system was fabricated for evaluation by the EOD and depot communities. User comments and design modifications were incorporated into subsequent iterations of the system. This process brought the program to the point of full-scale developmental and operational testing.

Developmental and operational testing consisted of numerous wear trials, with EOD and depot workers performing simulated missions for 4-hour periods. Trials were conducted until all the STEPO ensemble components suits had undergone five 4-hour wear cycles. At the end of the wear trials, the suits were cut up into swatches, and components were tested against live chemical warfare agents.

Phase I developmental and operational testing was conducted from May to June 1994 at Dugway Proving Ground, located in the Utah desert. Using updated test items, Phase II developmental and operational testing was conducted from May to June 1995 at Dugway. Final testing was completed in May 1997, and the Army adopted the STEPO system in November 1997. A requirements-type, fixed-price delivery order contract was awarded in July 1998 to Geomet Technologies, Inc., of Germantown, Maryland. The projected initial fielding date for the STEPO system is August of this year.

Logistics Support and Maintenance Structure

The STEPO maintenance concept will use organic maintenance and supply support for the suit, I-SCBA, rebreather, and PICS. Maintenance will consist of operator preventive maintenance checks and services, unit-level maintenance, and depot-level maintenance. There

☐ A munitions handler attaches a 50-foot air line to his STEPO suit before entering a potentially hazardous storage area.

is no maintenance required for the CS, which is discarded rather than repaired. In addition, CS replacement components will be obtained from the commercial vendor rather than through the Federal supply system. Electronic technical manuals (TM's) will be available for the overall system, the suit, rebreather, PICS, and I-SCBA. Information on the CS will be included in the STEPO system and suit manuals, so a separate TM for the CS will not be required.

Fielding

The STEPO system will be fielded under modified total package fielding procedures. The STEPO prime production contractor will deliver the encapsulating suit, rebreather, PICS, initial spare parts, support equipment, and TM's directly to the receiving units. SBCCOM at Rock Island, Illinois, will coordinate delivery and equipment hand-off. PM-Soldier will procure the CS under a separate contract and coordinate delivery of that component. The I-SCBA, which is already in the Government inventory, will be fielded before other STEPO components to satisfy an immediate user need for that item.

An essential aspect of the fielding process will be the new equipment training provided to users. To provide high quality training while holding down program costs, a small, select cadre of users will be provided instructor and key personnel and new equipment training by the STEPO contractor. These personnel will in turn train others in the operation and maintenance of the STEPO system—the Army's state-of-the-art personal defense against chemical-biological threats. ALOG

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Defending the BSA With Indirect Fire

by Captain Joseph D. Heck, Jr.

In November 1997, the 1st Brigade, 25th Infantry Division (Light), from Fort Lewis, Washington, conducted a light-heavy task force rotation at the Joint Readiness Training Center (JRTC), Fort Polk, Louisiana. In an effort to provide uninterrupted combat service support, the 25th Forward Support Battalion (FSB), as an integral part of the task force, established the brigade support area (BSA), integrating all aspects of a combined arms defense. The most effective combat multiplier in the defense of the BSA was indirect fire from the 2-8th Direct Support Field Artillery Battalion.

The 25th FSB's success in defending the BSA can be attributed directly to the detailed planning efforts and execution of the FSB staff and the indirect fire supporters. I hope this article will be useful to forward support battalions participating in future rotations at JRTC who must establish a proactive defense in order to accomplish our ultimate mission—support the combat soldier in battle.

—Lieutenant Colonel Sam Holloway
Commander, 25th Forward Support Battalion

Defense of the BSA is critical to providing uninterrupted combat service support. Using effective indirect fires improves BSA defense. During a JRTC rotation in 1997, the 1st Brigade, 25th Infantry Division, proved that a dedicated fire support element (FSE) can make the difference in the success of those fires.

Although Army doctrine states that fire support in the rear is the responsibility of the brigade fire support officer (FSO), a full-time FSE is essential to the BSA. However, the brigade's modification table of organization and equipment does not authorize a BSA FSE. As a remedy, the direct-support field artillery battalion commander can use internal task organization to appoint an FSE for the brigade rear area. The commander of the battalion's headquarters, headquarters and service (HHS) battery usually is given the additional responsibility of planning fires as the BSA FSO.

Because the HHS battery commander has other work priorities, planning fires is often just a paper drill. When this occurs, fires fail and so do credibility, trust, and confidence in fire support. The leaders of the 1st Brigade know that indirect fires can influence all combat, combat support, and combat service support operations. The leaders of the 2d Battalion, 8th Field Artillery, and 1st Brigade have instilled this concept into the hearts and minds of every soldier by emphasizing fighting with fires in the close fight. The bottom line is to apply fires at the right time and place on the battlefield, to include the rear area.

My service as the BSA FSO during JRTC rotation 98-02 was a very rewarding experience. Since there is little information on how to employ fire support in the brigade rear area, we had the opportunity to try new techniques. Using the basic principles of defensive-fire planning, we constantly sought means to influence our area of operation with fire support. Let me offer some advice, based on our experience, that can help your unit create a successful BSA defense using indirect fire support.

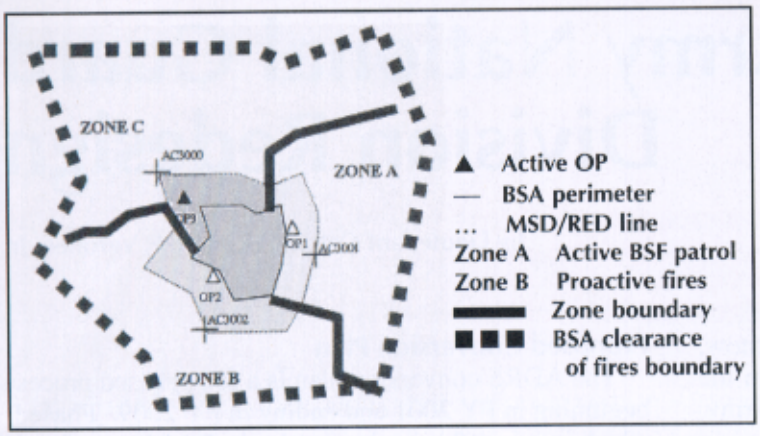
Before You Go

It is critical to coordinate, rehearse, and execute the tactics, techniques, and procedures presented in this article while at your home station. Develop a BSA battle drill that allows for a rapid clearance and execution of fires. Working out of the FSB tactical operations center, the BSA FSE should include two soldiers, preferably a commissioned officer and a noncommissioned officer (NCO). The FSB should provide all the necessary equipment, including two radios connected to an OE-254 antenna.

Safe-Fire Perimeter

The FSE NCO should accompany the advance party to a new position and begin surveying the BSA boundary. He should determine the grid location of each tenant unit in the BSA using a precision lightweight global positioning system receiver (PLGR). We used 10 grid locations to define the BSA perimeter during our JRTC rotation. At a minimum, use an 8-digit grid for each tenant unit or point on the perimeter. Plot each grid location on your map. This will give you an estimate of what the BSA looks like.

As soon as the perimeter of the BSA matures and tenant units complete occupation, these grid locations must be refined. Using a fine pencil, draw the new, refined BSA perimeter on your map and draw a risk estimate distance (RED) or minimum safe distance (MSD) line farther out depicting the area beyond which fires can be safely delivered. Planned targets and targets of opportunity should be on or beyond this line. *Minimum safe distances are never exceeded during peacetime live-fire training.*



☐ **BSA defensive fireplan layout.**

Targets, Buffer Zone, No-Fire Areas

Once you have marked the BSA on your map, locate your targets with a PLGR. Targets should be as close to the perimeter as the BSA commander allows. At JRTC, I advised him to use MSD until firing units met the five requirements for accurate predicted fire, then use a RED of 0.1 percent probability of incapacitation. Use PLGR waypoints to determine your targets instead of walking to each one. This offers force protection and expedites the refinement of targets when the perimeter is developed fully.

Once targets are determined, coordinate with higher headquarters and establish a 500-meter buffer zone beyond those targets. The FSB commander owns the ground within the buffer zone. Thus, he has the authority to clear fires in this zone. This facilitates the use of fires because he does not have to clear targets with adjacent units.

No-fire areas (NFA's) also are established as a control measure. Establish NFA's around air defense systems, drop zone security teams, observation posts (OP's), and the reverse osmosis water purification unit. Where possible, establish the location of all NFA's, especially OP's, using a PLGR.

Perimeter Defense Elements

Divide the 500-meter buffer zone around the perimeter into three or four segments. With three or four manageable segments, the reconnaissance and surveillance, OP, and obstacle plans can be synchronized easily with the fires plan. For example, if the buffer zone is broken into three segments, the defense could use OP's in one segment, patrolling in another, and proactive fires in the third.

Proactive fires are synonymous with harassing and interdiction fires. At any given time during our JRTC rotation, a dismounted base security force (BSF) patrolled one segment, an OP was manned in a second segment, and a schedule of fires was used in the third to balance out the entire buffer zone. The purpose of these fires was to enable continuous CSS operations by preventing the unconditional use of the buffer zone by the opposing force (OPFOR). Because of our random use of proactive fires, the OPFOR never had complete freedom of movement and the BSA did not receive contact without early warning.

By their nature, proactive fires also serve as deception fires because they disrupt the enemy's decision-making process. An occasional white phosphorous or high-explosive round will make the OPFOR seek cover. An illumination round will make the OPFOR think it has been observed and seek concealment.

The FSO should participate actively in planning, coordinating, and executing all perimeter defense elements—proactive fires, BSF, and OP's—to ensure that they integrate and synchronize smoothly. Proactive fires will result because the FSO has a part in the positive control of defense elements outside the perimeter.

During the JRTC exercise, we found that the perfect opportunity for the FSB commander, S3, S2, and FSO to coordinate perimeter defense for the next 24 hours was immediately after the 0600 hours shift changeover meeting. An 1100 hours tenants' meeting was part of the battle rhythm and served to brief everyone on the perimeter defense plan for the next 24 hours. The daily defensive plan included an updated sector sketch with new OP locations and NFA's. The defensive plan also included a schedule of when we would fire during the next 24 hours and when and where the BSF would patrol.

Stepped-up patrolling and our use of fires at night made up for a degraded level of security, particularly when soldiers were cold and wet. Most of the fires were nonlethal, using smoke during the day and illumination at night.

Fighting with fires in the close fight reflects the belief that we can support and influence all combat operations. It is critical that rear area defense is well-planned and executed. When they are in contact with the OPFOR, logisticians and all BSA tenants should be thinking about fires. If we can execute by attacking our planned targets, we can earn their respect. When we earn their respect, their first thought will be fires. **ALOG**

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Army National Guard Division Redesign

by Lieutenant Colonel Bernard F. Veronee, Jr.

As many associated with the military know, the majority of the force structure is contained in the reserve components. This is especially true in the Army. Over the years, the Army's structure has changed in personnel numbers, numbers and types of organizations, and missions. As recently as fiscal year (FY) 1994, the Army Reserve was restructured significantly by converting the vast majority of its combat units to combat service (CS) and combat service support (CSS) units. This resulted in approximately 56 percent of the total remaining combat units being in the Army National Guard (ARNG). It is in these units that the next major reserve component force structure change is to take place. This change will result from the ARNG Division Redesign Study (ADRS) (not to be confused with the active Army's division redesign).

Background

Total Army Analysis 2003 (TAA03) estimated a CS and CSS shortfall of approximately 124,800 in the number of spaces required to meet the National Military Strategy. The congressionally appointed Commission on Roles and Missions of the Armed Forces recommended in May 1995 that "Reserve component forces with lower priority tasks should be eliminated or reorganized to fill force shortfalls in higher priority areas." The Guard ADRS program, which was approved by the Secretary of the Army on 23 May 1996, reduces the Army's CS and CSS force shortfall. The ARNG plan converts up to 12 lower priority ARNG combat brigades and slice elements from 2 divisions to the required CS and CSS structure during FY's 1999 to 2009.

Pre- and Post-Design Configuration

The current ARNG division and brigade force structure consists of 8 divisions, 15 enhanced separate brigades (eSB's), and 3 separate brigades. When the ADRS is completed, the ARNG will consist of three divisions as presently configured; three divisions that have an eSB (which displaces a maneuver brigade in the division); two AC/ARNG integrated divisions, one each at Fort Riley, Kansas, and Fort Carson, Colorado (each having three eSB's); two composite divisions formed by reconfiguring two existing ARNG divisions; and six stand-alone composite brigades.

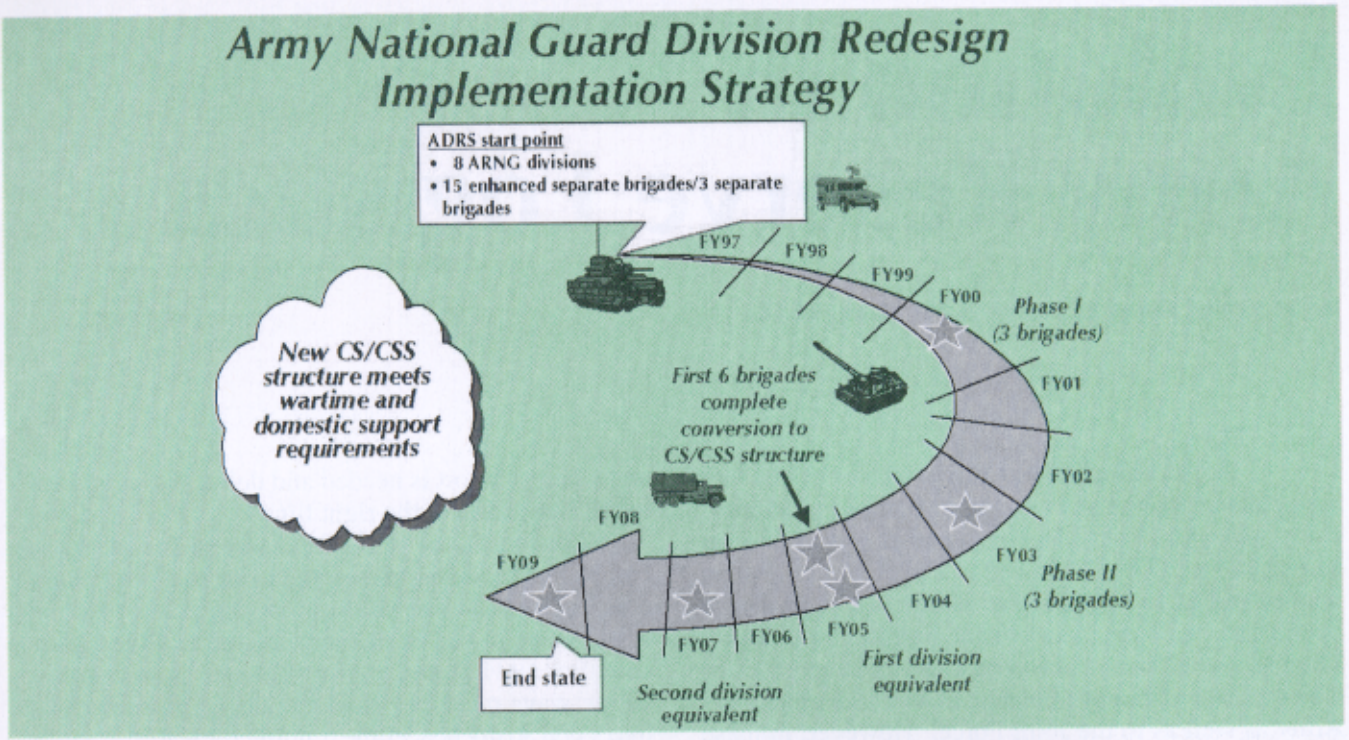
Proposed Conversion Plan

The ADRS conversion plan is a four-phased process beginning in FY 2001 and ending in FY 2009. Phase I, which involves 3 brigades, begins in FY 2001 and ends in FY 2005. The brigades to be converted are the 2d Brigade, 40th Infantry Division; 67th Brigade, 35th Infantry Division; and 2d Brigade, 38th Infantry Division. All units being converted were volunteered by their states. The three brigades to be converted in Phase II, which takes place during FY 2003 to FY 2005, are yet to be determined. Phases III and IV will convert two divisions in the FY 2005 to FY 2009 timeframe.

Training

Many ARNG officers and senior noncommissioned officers (NCO's) are qualified in two or more branches or military occupational specialties (MOS's). Conducting reclassification training for them presents a significant challenge because of the sheer numbers involved. For example, during Phase I there are 6,580 total training requirements. Almost 85 percent (5,565) of the training requirements are contained in 11 MOS's. ADRS expects the Total Army School System (TASS) to be key to the successful conversion effort, since most training will be conducted at reserve component TASS battalions. Training assumptions for ADRS are—

- Units will be targeted to train 100 percent of their reclassified soldiers to be qualified in their duty MOS's.
- Cross-leveling between units will not take place because of geographic dispersion.
- Units currently under strength will recruit to 100-percent strength.
- Sixty percent of new recruits will have previous service and will require reclassification training.
- A 1-year carrier unit identification code is approved.
- Seventy percent of the training will be conducted in the carrier year, and 30 percent will be conducted in the execution year.
- Personnel holding an MOS (duty, primary, or secondary) needed in a new unit will be assigned against that position and not require reclassification training.
- Many officers will have to undergo some sort of branch-qualification training. The proponent schools are developing web-based instruction to accommodate this



requirement. Transportation Corps branch qualification training is already on line, and Quartermaster branch qualification should be available on line this summer.

Because the officers who require branch-qualification training are coming from combat backgrounds and there is no cross-leveling between units, the Guard faces another significant training challenge. Not only must these officers be branch qualified, but it is critical that they also attend a multifunctional logistics course of some type. Courses currently available to meet this requirement include the Support Operations Course, the Reserve Component Multifunctional CSS Course, the Associate Logistics Executive Development Course, and the Combined Logistics Captains Career Course.

Funding

Each of the four phases of ADRS is to be executed as a stand-alone program that is funded in six resourcing areas—

- Equipping: Provides funds for issuing new equipment to the activating units.
- Training: Includes the cost of both branch and MOS and new equipment training.
- Installations: Used primarily to fund facilities such as maintenance areas, armories, storage areas, and the changes required to accommodate the new equipment. Training area utilization also is affected.
- Sustainment: Covers the costs associated with operations and maintenance requirement changes, second-destination charges (where the new equipment is inspected is not necessarily its final destination), and bringing equipment up to 10/20 standards.
- Manning: Includes additional expenditures for turn-in and issue, program management, and training.
- Environmental: Covers expenses associated with spill-prevention measures for fuel and other toxic substances.

Phase I is programmed to cost $737.3 million, including $406 million for equipping; $138.3 million for training; $158 million for installations; and $35 million for environmental compliance.

Title 10 Tour Opportunities

The ARNG has positions open in the Title 10 Active Guard Reserve Tour Program. There are opportunities in many fields for both officers and NCO's, especially those in CSS branches and MOS's. For more information about the Title 10 program, contact the Assistant Chief of Staff, ARNG, Army Combined Arms Support Command, Fort Lee, Virginia, at (804) 734-0426 or DSN 687-0426, or send an e-mail to leel1@IMC-lee.army.mil.

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Evolution in Army Reserve Logistics

by Lieutenant Colonel Anthony E. Winstead, USAR

The United States Army Reserve (USAR) has been called upon to serve our Nation in more varied missions in the last 5 years than in any other period since its activation in 1908. Today, the USAR is performing mission-critical tasks in domestic assistance, contingency operations, overseas deployment training, and peacekeeping operations, and its combat service support (CSS) core competencies have become essential to America's Army as well as to the Joint Force. However, in these times of continued resource reductions, the USAR must address numerous problems while proving that it remains an important component of our national defense.

Among the critical problems faced by the USAR are decreasing resources allotted under recent program objective memoranda, incomplete accountability of equipment, distractions from training, and a large infrastructure of table of distribution and allowances (TDA) activities. These problems have resulted in the stockpiling of supplies, difficulty in training as we fight, an automation architecture that continues to lag behind its active component counterparts, and an antiquated logistics system that contributes to a shortfall in readiness.

The combination of numerous real-world missions, a focus on meeting mobilization requirements, and a tremendous increase in the fielding of new equipment has shaped the USAR focus for the near term. But before the USAR can participate fully in the Army's Revolution in Military Logistics (RML), its current logistics infrastructure must evolve to provide maximum efficiency and effectiveness while enhancing unit readiness. What is needed is an *evolution* in Army Reserve logistics.

RML and the Army Reserve

According to the RML campaign plan, 21st century logistics will be transformed from the current supply-based system into one that is distribution-based. This new system will be created by fusing information, logistics, and transportation technologies. It will be an anticipatory, focused logistics system that predicts what and where support is needed and delivers the right stuff to the right place at the right time.

Reductions in the active force have made the reserve components even more essential to meeting the Nation's needs across the full spectrum of operations, from disaster relief to war. With more and more of the logistics structure moving to the Army Reserve, new and innovative ways must be found to integrate Reserve units into Total Army peacetime training for wartime deployment. The use of USAR logistics forces must be planned so that the total support force can be structured precisely to meet 21st century challenges.

The USAR vision to evolve in military logistics captures the intent of the Army RML campaign plan. The USAR Logistics Strategic Management Plan will guide USAR logistics into the future. Initiatives contained in the plan are designed to permit the evolution of the current logistics infrastructure, enhance unit readiness, and enable USAR logistics to develop into a full-spectrum, distribution-based system that incorporates velocity management and information technology to their fullest.

The Army Reserve Today

Today's restructured Army Reserve emphasizes its proven core competencies. It provides 45 percent of the Army's CSS units, 30 percent of its combat support (CS) units, and 100 percent of its training and exercise divisions. The USAR contains 100 percent of the Army's railway units, 100 percent of its enemy-prisoner-of-war brigades, 97 percent of its civil affairs units, 86 percent of its psychological operations units, 70 percent of its medical care units, and 62 percent of its chemical and biological defense capability.

The Army Reserve is the most utilized of all the reserve components in the Department of Defense today. It furnished 74 percent of the reserve component forces mobilized for Operations Joint Endeavor and Joint Guard in Bosnia, 35 percent of all reserve component forces participating in Operations Desert Shield and Desert Storm, and 68 percent of all forces mobilized for Op-

The Army Reserve furnishes much of the Total Army's combat service support. That means the development of its logistics infrastructure will be a major feature of the Revolution in Military Logistics.

eration Uphold Democracy in Haiti. In spite of this high utilization rate, the USAR has the lowest percentage of full-time support (FTS) positions among the reserve components: only 9 percent of the Selected Reserve are in FTS positions. By comparison, FTS levels are at 13.3 percent for the Army National Guard, 26.1 percent for the Naval Reserve, 17.2 percent for the Marine Corps Reserve, 31.5 percent for the Air National Guard, and 23.1 percent for the Air Force Reserve.

To attain its high state of readiness, the USAR has slashed its overhead, prioritized its resources, and infused technology and proven business principles into its training, administration, and logistics. It has not been easy, but the USAR in many cases has led the way in how to do business for the entire Army.

By refining its CSS and CS core competencies, the USAR has enhanced the Army's mobilization capabilities. Under the guidance of the Army leadership, and with appropriate resources furnished by Congress, the USAR has transformed itself through a variety of initiatives into a more relevant and ready force in support of the National Military Strategy.

The Army Reserve in Army XXI

How is the Army Reserve closing the gap between where it is today and where it wants to be in Army XXI? The Office of the Chief, Army Reserve, and the U.S. Army Reserve Command (USARC) have developed numerous initiatives that focus on ensuring that the Army Reserve is relevant and ready to meet the Army's requirements in the programmed force. These initiatives address an array of USAR core competencies, including deployable support units, power-projection platforms, and training base and readiness improvements.

These initiatives are aimed at enhancing USAR capabilities to perform logistics missions by improving business processes, streamlining organizational structures, and getting the most out of peacetime training. The initiatives will strengthen the USAR as the chief CSS provider to America's Army by obtaining the best value for logistics support operations, incorporating innovations in information technology, and ensuring interoperability across Service components and Defense agencies. Let me survey some key aspects of these initiatives.

The USAR is converting the 310th Theater Army Area Command (TAACOM), at Fort Belvoir, Virginia, to the theater support command (TSC) structure. The rationale for the TSC is the need to meet early deployment requirements, when strategic lift is most critical and the "fog of war" is greatest. The TSC concept stresses modularity, split-based operations, and unity of command. The TAACOM materiel management center (MMC) will be redesignated as the TSC MMC and will perform both the area support function of the TAACOM MMC and the sustainment support function of the theater army MMC. The TSC will provide the Army with a trained organization that is fully capable of handling the key early-deployment functions of reception, staging, onward movement, and integration (RSOI) and contracting.

The USAR organizational structure will be aligned under a continental United States (CONUS) theater area support concept. This concept assigns a base support area to each USAR MMC. Doing this will support the RML plan to integrate these units into Army-wide support requirements, as well as the aim of the Chief, Army Reserve, to train units as they will fight.

Selected TDA positions in USAR area maintenance support activities (AMSA's) and equipment concentration sites (ECS's) are being considered for realignment as modification table of organization and equipment (MTOE) direct support (DS) maintenance organizations. Transferring these TDA positions to MTOE units will improve their ability to train as they fight, reduce maintenance backlogs, and provide mission-oriented training that should increase the retention of soldiers. The AMSA's and ECS's are staffed with full-time military technicians. It makes good sense to assign the majority of these key personnel to TOE, "go-to-war" USAR units in order to make use of their knowledge, experience, and continuity.

The USAR is prepared to outsource "low-end" or-

ganizational maintenance requirements to local civilian contractors and transfer DS maintenance requirements from installations to reengineered DS and general support (GS) maintenance companies. This will enable full-time military technicians and Active Guard/Reserve (AGR) soldiers to concentrate on the DS and GS maintenance backlog on a daily basis; it also will create incentives for offering meaningful DS and GS maintenance tasks to drilling soldiers on weekend training.

The USAR has initiated partnerships with industry, seeking the research, engineering, and management expertise of companies such as Caterpillar, Freightliner, NAPA, VSE Corporation, Camber, and INNOLOG. In addition, the USAR is inviting industry to observe its business management practices and to train with reservists on and off site in order to find the most efficient ways of managing the new maintenance and supply structures, achieving cost avoidances, providing challenging training to soldiers, increasing retention rates, and developing an organization that can benefit continually from industry's changing techniques.

The Army has contracted with industry to provide technology insertions that upgrade existing vehicles and other systems. Using new and innovative technology on existing equipment extends that equipment's life cycle, reduces maintenance and supply requirements, and increases equipment readiness. Insertion and conversion kits will be installed primarily by Army Reserve soldiers at DS and GS maintenance units after industry has trained them; this not only will strengthen the USAR partnership with industry but also encourage retention by providing the soldiers with challenging, professional work.

USAR wheeled transportation assets are becoming the best in the Army for line-haul operations. The goal of the USAR transportation structure is to leverage industry to form a worldwide USAR power-projection platform. With the evolution of transportation equipment and computerized fleet management and the increase in technically competent USAR personnel, USAR transportation will become extremely effective and a powerful enabler for the Total Army. USAR transportation assets needed to deploy forces and deliver sustainment support will be fully integrated into the Total Army mission.

The USAR has developed new supply functions that will radically transform a supply-based, mass inventory system into a distribution-based supply system. The USAR plans to create a retail supply support organization that will allow USAR DS and GS supply units to provide retail supply support to active and reserve component units while maintaining a reliable, productivity-based operation; allow USAR soldiers to train on tasks related to their unit's wartime (MTOE) mission using assigned unit organic equipment and systems; and provide for peacetime use of logistics Standard Army Management Information Systems (STAMIS) fielded to USAR units. These actions will promote an Army transition that significantly reduces the density and redundancy of supplies, including prescribed load lists, authorized stockage lists, and other repair parts and depot stockage levels.

Closely tied to these supply initiatives are the integrated sustainment maintenance (ISM) bids that are being submitted by directorates of logistics (DOL's) on USAR installations. Fort Dix, New Jersey, and Fort McCoy, Wisconsin, are bidding to rebuild engines, transmissions, and other high-volume major repair parts for the Total Army. USAR GS maintenance units are full participants with DOL's during training weekends and annual training. ISM provides a tremendous cost savings to the USAR and offers meaningful, mission-oriented training for soldiers.

Currently, the USAR has several ongoing automation initiatives aimed at improving its automation architecture. STAMIS resource requirements and shortfalls have been compiled, and priorities for fielding and resourcing each STAMIS have been clearly defined and documented. All USAR DS and GS CSS units having a supply mission are receiving the Standard Army Retail Supply System-1 (SARSS-1). The 55th, 304th, and 321st MMC's are converting to SARSS-2A and the Corps/Theater Automatic Data Processing Service Center-Phase II (CTASC-II), which will enable them to provide stock control and materiel management to their areas of support, as well as stock funding, GS supply support, and storage operations for USARC installations. These initiatives are linked to constantly evolving concepts in automation architecture and will foster interoperability and compatibility with the active component.

Another key initiative is the use of three different types of storage facilities for storing and maintaining equipment. Equipment placed in these facilities will not be required to support training at USAR training centers during weekend drills. Only unit mission-essential equipment for training (MEET) will be stored and maintained at the owning unit's training centers. The three types of facilities have distinct functions, and their locations will be determined by training support and mobilization requirements.

The Next Step in the Evolutionary Ladder

The USAR Logistics Strategic Management Plan is

an essential planning tool to transform USAR logistics. However, I would like to recommend the following additions to the plan. These recommendations are aimed at achieving the goals of the Army RML, while recognizing that it is a long-term strategy that will go through changes—

- Expand the USARC's proposed Theater CONUS Area Support concept and give the 310th TSC (Provisional), the 377th TAACOM, and the 311th Corps Support Command (COSCOM) the doctrinal mission to command and control assigned and attached units within their areas of support, including planning and directing CSS on an area basis. In effect, this would reduce the command and control role of the USAR's regional support commands and increase the role of each TSC, TAACOM, or COSCOM. That in turn would reduce the USAR's TDA infrastructure, enable MTOE units to perform their combat missions in support of an operational requirement, and enhance the USAR mission of providing CSS to combined and joint operations.
- Expand the role of the USAR MMC's to include base operations support, such as retail supply support, for all Army Training and Doctrine Command installations. USAR SARSS-Objective systems can handle the associated work load efficiently. This initiative would create a doctrinally correct environment, provide production-based and mission-oriented training for reservists, and save money for the Total Army.
- Significantly reduce the number of AMSA's in the USAR force structure and transfer all AMSA resources (personnel, equipment, and budget) and missions to TOE units (organizational and DS). Reduce the 32 ECS's to approximately 16 and expand their mission to include operations of equipment storage site-expanded (ESS-X) and deployable equipment preparation site (DEPS) facilities.
- Increase the full-time manning in USAR TOE maintenance units (organizational, DS, GS, and aviation intermediate maintenance) to accommodate all transfers from TDA activities, with the right mix of active reservists (AGR) and military technicians.
- Establish a workforce partnership with industry that contracts industry to accomplish "low-end" unit and organizational maintenance tasks. This will facilitate essential mission-oriented maintenance training, which reinforces sustainment of military occupational skills and enhances retention of quality soldiers. These actions will produce organizations that support unit operational readiness, support the USAR's goal of training in peacetime for the wartime mission, and enable the USAR to project itself as a national provider for CSS.
- The USAR leadership must provide the concepts and processes that permit sequential, progressive changes (in other words, changes that initially affect a limited sector of the USAR and then lead to larger and more comprehensive changes that can be implemented throughout the entire USAR organization). The design of each pilot organization must concentrate on evolutionary initiatives that reflect key features of the desired end state and can be tested and validated in a carefully controlled environment. The lessons learned from the first pilot then must be applied to the design of subsequent organizations in each CONUS theater area of support.

Modernization efforts are designed to help the logistician in the Army After Next to know in advance what is needed by the warfighter, predict delivery where it is needed at the time it is required, and move what is required by delivery methods that use rapid, innovative transport techniques and platforms. The Army must evolve to the state envisioned in the Revolution in Military Logistics concept as a partner with all military components as well as with industry.

The road map for the USAR evolution will be characterized by challenging traditional ways of doing business and fostering innovation and experimentation. The result must be an Army Reserve logistics force that leverages technology to combine new concepts, information, and logistics systems and reshapes the way it projects and sustains America's Army into the 21st century. Logistics leaders in the Total Army must determine what must be done today to make our RML achievable and develop Army Reserve logistics capabilities that maintain parity with the active force. **ALOG**

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The Role of the Quartermaster Corps in the Revolution in Military Logistics

by Lieutenant Colonel Karen E. Good

The Quartermaster Corps is at the forefront of the Army's Revolution in Military Logistics. While the basic Quartermaster missions to sustain soldiers and support operations will not change, the ways in which these missions are accomplished will change significantly. These changes will be implemented through a series of conceptual, organizational, and materiel initiatives in the areas of maximized throughput, consolidated supply support activities, logistics maximizers, fuel distribution, sustaining soldiers, and mortuary affairs.

Maximized Throughput

During the past several years, we have developed working concepts for applying new technologies that will help attain total visibility of assets en route to, and at, various logistics nodes. When these technologies are fully fielded, we will have "situational awareness" of the entire logistics system from point of origin all the way to the tactical combat area. Bar-coding of containers and their contents, materiel, and vehicles has become a standard practice to improve our tracking capability. Radio frequency (RF) tags are quickly becoming the key means to track items in transit. We also are able to configure loads at the depot, factory, port, or other distribution node for a specific user and purpose and deliver these loads intact as far forward as possible. By electronically tracking these custom-filled containers and the individual components inside, we can identify consistently how much and where supplies and materiel are located at any given time. This visibility, together with vastly increased velocity and the ability to anticipate real-time needs in the field, will facilitate rapid, timely delivery to a destination and eliminate erroneously shipped or received cargo. In other words, Force XXI battlefield distribution will increase vastly our ability to provide the right stuff to the right place at the right time.

Consolidated Supply Support Activity

A new Force XXI concept under development is the consolidated supply support activity (CSSA). The CSSA will be a critical aspect of the distribution-based logistics system. It streamlines the logistics pipeline by reducing the number of logistics units (the logistics footprint) on the battlefield. A glance at the current support array shows multiple retail providers spread throughout the support areas. The CSSA will serve as a single retail provider of food; general supplies; packaged petroleum, oils, and lubricants; barrier materials; and major end items. Distribution of repair parts, mail, and general medical supplies for nonmedical units also is under consideration for addition to the CSSA's functions. Altogether, the projected CSSA concept will help to maximize throughput, thus making the most effective use of the distribution infrastructure.

With the CSSA, customers no longer will have to drive to different locations to pick up different types of supplies. Everything will be situated at the same distribution node in the same geographical area. In addition, customers will not have to deal with multiple organizations that are working under different field operating procedures. In Force XXI, a single unit—the conceptual quartermaster support company—will operate the CSSA. This alignment will optimize the force structure by reducing redundant headquarters elements, which will decrease the battlefield logistics footprint even further.

Logistics Maximizers

Logistics maximizers are key components of the battlefield distribution system of the future. Included are an all-terrain forklift and several aerial delivery sys-

☐The ATLAS has both a 6,000- and a 10,000-pound carriage, which makes it possible to transload pallets quickly.

tems to provide fast support to forward-deployed units. The wide dispersion of future battlespaces will make air delivery an increasingly important element of distribution.

All-terrain lifter Army system (ATLAS). To move palletized loads on the ground, we traditionally have used 6,000- and 10,000-pound forklifts. While they do the job they were intended to do, they have a low readiness rate and are expensive to maintain. The ATLAS has both a 6,000- and a 10,000-pound carriage and increases our ability to transload pallets quickly, thus enhancing our logistics power projection capability.

Enhanced container delivery system (ECDS). This system is proving to be a distinct improvement over the existing container delivery system (CDS). The ECDS uses a new, reinforced pallet that is similar to the 463L pallet but is easier to rig, lift, and transport. It can be moved by forklift and sling-loaded. The current CDS is capable of handling only 2,200 pounds per system, while the ECDS can handle up to 10,000 pounds. This greater capacity reduces dispersion of loads across a drop zone.

Extraction parachute jettison system (EPJS). In the event cargo becomes jammed during airdrop, the EPJS allows the loadmaster to release the extraction parachute(s) instead of jettisoning the entire load. This feature greatly increases aircraft safety and load survivability. The EPJS will be rigged on all platform airdrop loads in the future.

Low-velocity airdrop system (LVADS). This system permits airdrop of heavy equipment from an altitude of 500 feet rather than the previous minimum of 750 feet. It provides single-platform delivery of large materiel items weighing up to 22,000 pounds, and allows the cargo aircraft to fly at the same low altitude as the personnel drop aircraft. The LVADS increases aircraft survivability and accuracy of the cargo drop.

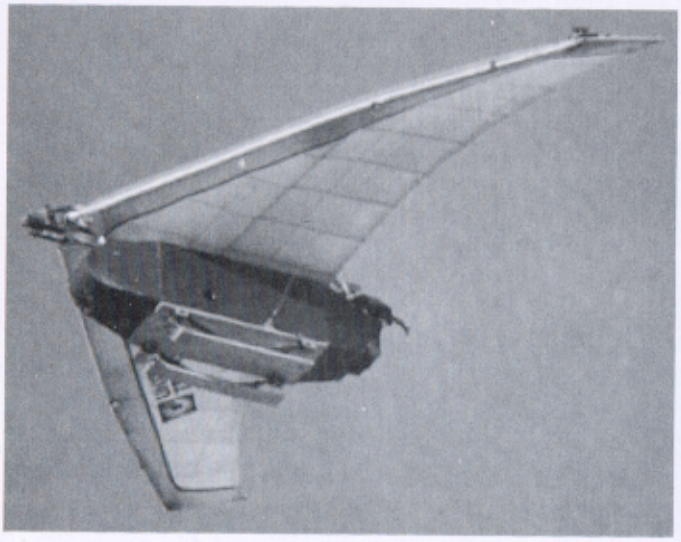
C–17 dual row airdrop system (DRAS). This innovative concept uses the C-17 transport's dual logistics rails instead of the current single rail. The DRAS enables logisticians to increase, sometimes double, cargo capacity while reducing the number of sorties necessary to resupply ground forces. Since loads can be deployed simultaneously, drop zone dispersion will be significantly reduced.

Advanced precision airborne delivery systems (APADS). One or all components of this conceptual family of computerized, high-altitude, offset-delivery systems will become the future air delivery method of choice. These innovative systems will allow aircraft to drop cargo up to 40 miles from the target, and the delivery system, equipped with a global positioning system (GPS), will insert the load precisely to within 100 meters of the user. Delivery aircraft will not need to fly over hostile territory to deliver supplies and materiel. This will ensure the safety of aircraft and personnel in support of the Army After Next and Strike Force operations.

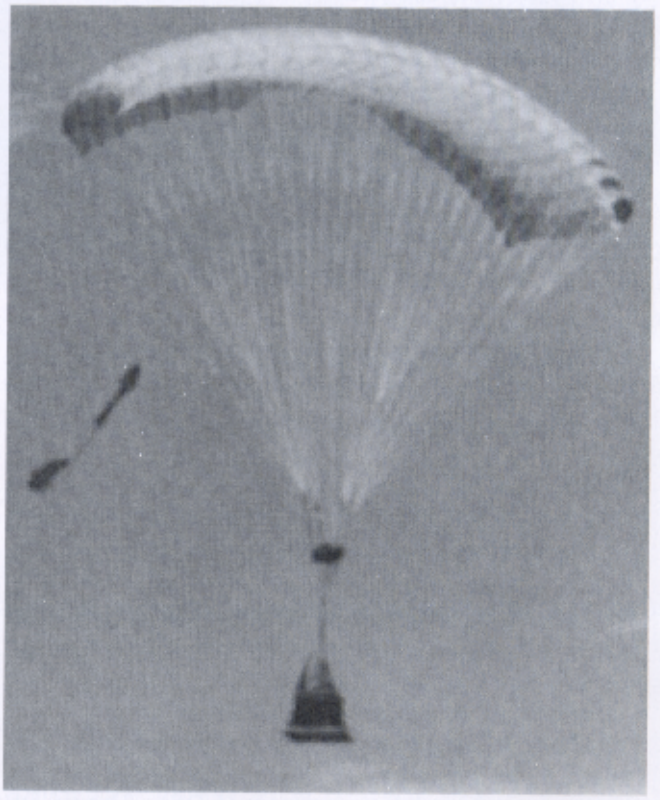
Fuel Distribution

To keep moving, an operational force must have sufficient fuel. Future operations are going to be conducted on fluid, nonlinear, probably austere battlefields with widely dispersed forces conducting around-the-clock movements. To support these operations, petroleum units are being redesigned into more mobile, agile, and modular entities capable of providing responsive support during all phases of deployed operations.

Petroleum units must be able to distribute fuel under circumstances vastly different from those faced in the past. The new concept for distributing bulk fuel calls for delivery as far forward as possible. To meet this requirement, logisticians must be able to communicate their



☐ **Each APAD system consists of a delivery platform (parafoil or semi-rigid wing) that has a global positioning system-based guidance, navigation, and control system. It can deliver military equipment, vehicles, and supplies within 100 meters of the target from an altitude of 25,000 feet.**



needs accurately and have a highly mobile system for delivering the right stuff to the right place at the right time. In other words, we need to tailor petroleum distribution to fit rapid force projection into austere areas with longer lines of communication.

Fuel distribution doctrine must include the tenets of throughput distribution, velocity management, and time-definite delivery. The doctrine also must address innovations in storage, pipeline, and transport operations, including using lighter weight hoses and bladders and improved lightweight pumps. Fuel distribution will be simplified by the continued conversion to a single battlefield fuel.

The idea of "containerized fuel" also is being explored as a distribution enabler for fuel. Using 3,300-gallon fuel tankracks that are compatible with palletized loading system trucks, fuel could be "containerized" near the port or in the corps rear. Then it could be moved forward into the division without any intermediate download to bags. A truck and trailer combination could move 6,600 gallons forward into the battle area to exchange full racks for empty ones. This would shorten resupply times significantly at the various support nodes at division level and below.

Sustaining Soldiers

Water purification. As we advance into the next century, the Army continually is looking for ways to improve our ability to obtain and distribute water to military personnel. We have come a long way from the rigid, often unsanitary steel pipeline used during the Vietnam era. New purification systems, such as the 1,500-gallon-per-hour (GPH) tactical water purification system (TWPS), will replace the older 600-GPH reverse-osmosis water purification unit. The TWPS will provide increased production and output capability. Fewer military personnel will be required to operate it, and there will be fewer possibilities for corrosion and contamination.

A lightweight water purifier is being developed that will provide 125 gallons of purified water each hour. This system will be able to fit into the back of a high-mobility, multipurpose, wheeled vehicle.

Force Provider. The challenge of adequately and consistently sustaining soldiers under a variety of circumstances led to the development of the Force Provider system. Force Provider is a containerized, portable soldier support system designed to take care of all the soldier's basic needs. It provides up to three hot meals per day, shower and laundry facilities, clothing repair, tents (with heaters), and morale, welfare, and recreation facilities. A Force Provider platoon (one module) can support 550 soldiers—a battalion-size force. A Force Provider company has 6 modules and can support up to 3,300 soldiers—a brigade-size force. Force Provider's unique feature is its mobility. Force Provider containers can be loaded onto standard trailers and hauled as far forward as needed. So, instead of pulling soldiers

☐ Using 3,300-gallon fuel tankracks that are compatible with palletized loading system trucks, fuel can be moved forward into the division without intermediate download to bags. A truck and trailer combination can move 6,600 gallons into the battle area to exchange full racks for empty ones.

back to the rear for "R&R" (rest and relaxation), our new system allows the "rear" to go to the soldiers.

Other key developments in soldier sustainment are the laundry advanced system (LADS) and the modern burner unit (MBU). LADS will replace the current M85 laundry system. One LADS unit will take the place of four M85's. It can be containerized and mounted on a flatbed trailer for easy transport and requires 75 percent fewer personnel to operate. Since LADS filters and recycles water, it needs only 270 gallons of water in a 10-hour shift. This water consumption compares with 24,000 gallons of water used by the M85's for the same amount of support and represents a potentially huge reduction in the acquisition, treatment, and transport of water within the theater of operations.

The MBU was designed to replace the old M2 burner. The MBU will fit in the same space as the M2 and will burn the less volatile JP-8 fuel rather than gasoline. The MBU is ignited in place, reducing the pre-heat period required with the M2 and virtually eliminating the ever-present danger posed by lighting the burner outside and moving it into the kitchen. Conversion to the MBU will be a significant step in reducing gasoline-consuming equipment in the battlespace.

Mortuary Affairs

One of the Army's biggest responsibilities is to ensure that soldiers are treated with as much respect and dignity after death as while they are living. We have an obligation to return the soldier's remains to his loved ones quickly and in the best condition possible.

Mortuary affairs technologies have evolved significantly during the last decade. The ability to test and match DNA, even when remains are quite old, virtually eliminates the chance that we will have "unknown" soldiers in the future and makes precise identification of remains relatively simple. In keeping with state-of-the-art identification, mortuary affairs has adapted the same technologies we use to track supplies and equipment. When remains are brought from the field to a holding area and positively identified, a permanent, hospital-type, bar-coded wristband is attached and activated. The wristband is used to track the individual throughout the journey home. This situational awareness enables both the Government and the family to know exactly where the remains are from point of embarkation until the aircraft lands at Dover Air Force Base, Delaware, or Travis Air Force Base, California.

With the advent and development of these and other key initiatives, the Quartermaster Corps has established itself firmly at the forefront of the Revolution in Military Logistics and is serving as a dynamic change agent in the Army's inexorable march toward the future. **ALOG**

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Foal Eagle '98

The 3d Brigade Combat Team, Tacoma, Washington, participated in the first combined-joint logistics over the shore (C-JLOTS) operation in the Republic of Korea during Exercise Foal Eagle '98. Some 35,000 soldiers, sailors, airmen, and marines from the Combined Forces Command participated in the exercise.

The goal of the exercise was to create a stable and secure environment in the region. The 3d Brigade transported equipment into Korea to serve as a deterrent to potential invading forces and, if deterrence should fail, provide offensive military power. The brigade loaded cargo onto the *USNS Pollux*, a fast sealift ship, at the Port of Tacoma. The ship crossed the Pacific Ocean and

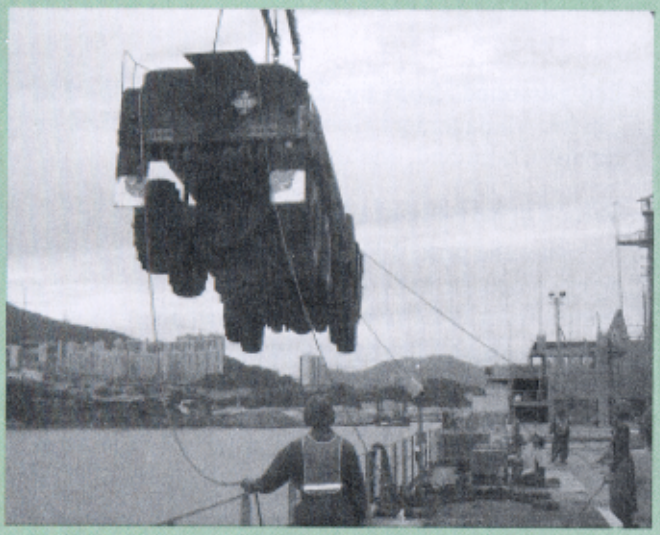
☐An Army logistics support vessel (LSV) (left) maneuvers into postion next to the *USNS Pollux*. Loaded with vehicles and equipment offloaded from the ship, the LSV cruises toward the port (above). The photo at the top of this page shows part of the 3d Brigade's 91-tent complex in Pusan, which included a medical aid station, chapel, dining hall, and shower and laundry facilities.

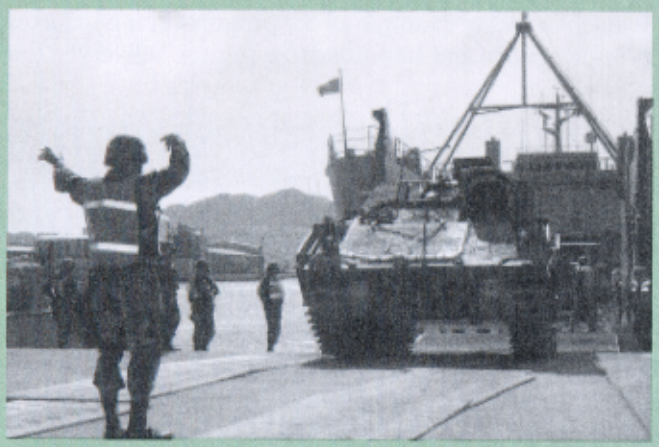
anchored approximately 2 miles from the Port of Pusan. Most of the equipment was discharged from the anchored *Pollux* to smaller logistics support vessels (LSV's) that can navigate through shallow waters and access beaches or damaged ports. A mobile, floating pier served as a bridge that allowed vehicles to drive off the *Pollux* and onto an LSV for the trip to shore. Other vehicles and containers were lifted by crane, lowered onto barges, and ferried to shore. Once delivered to the port, the cargo was staged for rail movement to Camp Casey in Tongduchon.

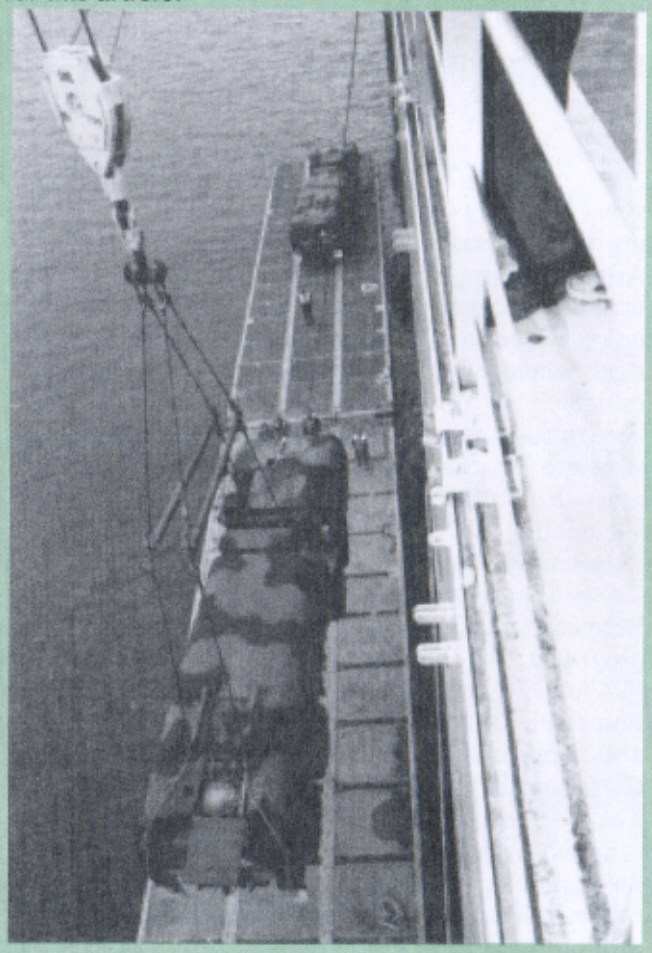
The operation tested the joint and combined ability to project a combat force into a region. Experience with LOTS operations is critical because more than 90 percent of wartime cargo and fuel is transported on ships, and large ships often cannot be docked in port. The uncertainty of port capabilities during war dictates that alternate methods of transporting cargo be available.

Foal Eagle is an annual field training exercise that involves the majority of U.S. and Republic of Korea military forces stationed on the Korean Peninsula. **ALOG**

Army Logistician *wishes to thank Captain Claude C. Bonvouloir and Specialist Frederick T. Findtner of the I Corps and Fort Lewis Public Affairs Office, Washington, for providing information and photographs for this article.*







☐A heavy, expanded-mobility tactical truck (HEMTT) fuel tanker is sling-lifted from the deck of the *Pollux* (top left) and is lowered onto a barge (top right) for the trip to shore. Above, an M2A2 Bradley fighting vehicle is offloaded at the Port of Pusan. A soldier inspects a convoy of vehicles preparing to move inland (right).

1st CAV Rolls Through Rijeka

by Major General Charles S. Mahan, Jr., and Brigadier General Mitchell H. Stevenson

When the 1st Cavalry Division deployed to Bosnia, it used a new route to get there: through the Adriatic Sea port of Rijeka, Croatia.

On 7 October 1998, the 1st Cavalry Division (1st CAV) assumed responsibility for peacekeeping duties in Bosnia for 1 year, taking over from the 1st Armored Division. Replacing one division with another in a foreign country is a tremendous task. Because that task is not performed often, there is little reason to have a permanent infrastructure in place for executing such a mission. Yet armies are constantly challenged by the need to quickly and efficiently create the required infrastructure for a mission, make the move, and then remove that infrastructure. That's what the 1st CAV did when it replaced the 1st Armored Division.

Recently the 1st CAV deployed through Rijeka, Croatia, rather than through the regular port of Bremerhaven, Germany. To help accomplish this deployment, the 21st Theater Army Area Command (TAACOM) established a logistics task force, Task Force Rijeka, headed by Colonel William Wolf, who also commands the 37th Transportation Command in Kaiserslautern, Germany. The task force was to assist the movement of vehicles, aircraft, and equipment from the port in Rijeka to their ultimate destination in Bosnia quickly, efficiently, and at a lower cost. For that move, the Army was able to demonstrate its ability to adapt to whatever challenges are placed before it. "Because this was the first time a CONUS [continental United States]-based unit was assuming the mission in Bosnia, we relooked the plans and relooked the way we were doing business and thought this would be a better and safer way of operating than to deploy through Central Region," said Wolf.

Many commands provided support for the arrival into Rijeka, including units and personnel from the 21st TAACOM, the Military Traffic Management Command (MTMC), the Military Sealift Command, and the U.S. Air Force.

Why Rijeka Instead of Bremerhaven?

Using the port of Rijeka was a logical choice for the Army since the 1st CAV's equipment was being transported from the United States rather than from within Europe. Rijeka provides a more direct route from the United States to Bosnia than going by way of Bremerhaven. Vehicles and containers traveled from Rijeka to Bosnia in 1 day compared to 3 days from Germany. Flying helicopters from Rijeka took a third less time than flying them from Germany. "The direct route through Croatia and the use of the Adriatic seaport points to the stability and improved infrastructure in Croatia. It also is another example of the progress being made in bringing peace and stability to the region," observed the

☐ The *USNS Soderman* unloads 1st Cavalry Division equipment at the port of Rijeka, Croatia. This was a new destination for Bosnia-bound shipments, replacing the usual route to Bremerhaven, Germany, and then through Hungary.

21st TAACOM's public affairs officer, Lieutenant Colonel Stephen Nolan.

Setting Up the Port

The network setup was a complete success. The local area network (LAN) was set up in the early days of the deployment and remained very reliable throughout the operation. "We are able to deploy in 72 hours, which is in accordance with SETAF [Southern European Task Force] standards," noted First Lieutenant Christopher Cooper, the officer in charge. "We can set up our local area network in 6 hours. The leaders who visited Rijeka were impressed by the capabilities of the fly-away network package and would like to use this capability in future receiving, staging, and onward movement missions."

The network server in Task Force Rijeka can connect to Germany by satellite, where that system links each individual user's account to his permanent e-mail account at his home station in Germany or the United States. "This is the first time I've seen this type of system work," Staff Sergeant Arthur Lewis, a computer technician from the 21st TAACOM, said. "Nobody really knew we would have this capability, not even myself, until we got here. A lot of people were planning on using the dial-up system, which is slower, more costly, and less efficient."

The 21st TAACOM requested assistance from the U.S. Army, Europe (USAREUR), Office of the Deputy Chief of Staff for Logistics (ODCSLOG) with installing automated identification technology (AIT). Radio frequency/in-transit visibility (RF/ITV) and Defense Transportation Reporting and Control System (DTRACS) equipment were requested for the port of Rijeka and the trailer transfer point in Okucani, Croatia. These would be quick installations designed to capture the tagged supplies coming into Rijeka and moving through the logistics channels to Bosnia. The infrastructure was already in place for RF systems within Bosnia, but additional interrogators were needed in Croatia to provide adequate visibility of incoming cargo.

On 27 July, members of the AIT Branch of USAREUR ODCSLOG visited Rijeka and worked with engineers, communications representatives, and local specialists. They walked around the area to make sure of the business practices in use and the locations the containers would be transiting. They recommended that the container yard, truck gate, and rail gate all be instrumented. Determining where interrogators would be installed was based on a number of factors, including—

- Information gathered during initial meetings with management and the local work force.
- Analysis of the day-to-day operations at the port, which included business practices and freight flow.
- Physical inspection of the potential interrogator points suggested by the local staff.
- The availability of the resources needed to implement an effective RF identification solution at the port.

The container yard held all of the tagged cargo arriving in Rijeka, so the entire yard was interrogated once every hour. The truck gate interrogator recorded any tags that were headed out of Rijeka (interrogation conducted every few seconds). The rail gate interrogator collected information on all rail movements as they departed the yard (also interrogating every few seconds). The one difficulty with using the rail gate site was that trains often staged near the rail gate's guard shack (where the interrogator was located), moved up to a nearby tunnel, and then moved back again a few times before finally departing.

On 12 August, the installation began preparing for the 22 August arrival of the 1st CAV's supplies. The Okucani trailer transfer point was surveyed on 14 August and equipment installed on 17 August. This location was a yard that the containers would enter and then leave 45 minutes to 8 hours later. The DTRACS was set up at both Okucani and Rijeka before the ship arrived with the 1st CAV's equipment, which gave the soldiers visibility of their trucks and communication with their drivers.

Croatians Working With U.S. Soldiers

This operation could not have been accomplished without the combined efforts of the Croatian people and the U.S. Army, said Wolf. "We're working side-by-side with civilian and military policemen from Croatia. There are 80 Croatian military police soldiers and 26 local municipal police here with us. That could not have happened without the help of each and every soldier, civilian, and Croat official who participated. I've never seen a better group of soldiers and civilians working together in my 25 years in the Army."

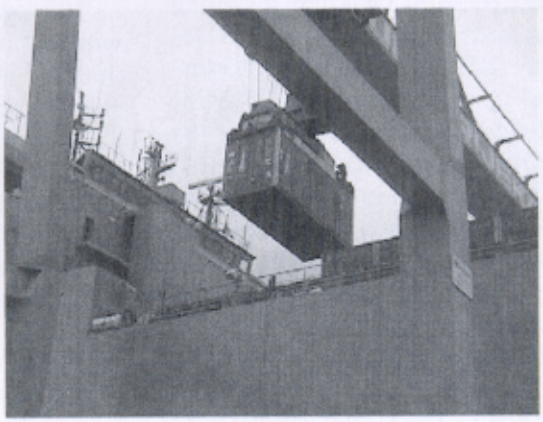
1st CAV Leaves Fort Hood

The *USNS Soderman* was loaded in Beaumont, Texas, on 4 and 5 August with equipment to support some 8,000 of the division's soldiers in the Operation Joint Forge mission. The *Soderman* is a large, medium-speed, roll-on-roll-off ship that carried more than 800 pieces of equipment, including 287 containers, 45 UH-60 Black Hawk and AH-64 Apache helicopters, and 377 vehicles from the 1st Cavalry Division, a U.S.-based, quick-reaction heavy division stationed at Fort Hood, Texas. The ship, operated by the Military Sealift Command, is 906 feet long, has a beam of 106 feet, is 15 stories high from keel to bridge, and provides over 300,000 square feet of cargo-carrying space.

Much of the equipment coming from the 1st CAV was tagged with RF tags, which provided electronic lists of what the commodities were. The RF tags were attached to containers so that soldiers would know what was inside and where supplies were in the pipeline. The RF tags also showed the time a container left Fort Hood, arrived at Beaumont, left Beaumont, and then arrived in Rijeka.

Arriving at Rijeka

The *Soderman* arrived in Rijeka on 22 August. Its arrival at the Adriatic seaport marked the military's first effort to deliver equipment to the Bosnia area of operations by such a direct route. The 1st CAV's equipment was received by the 21st TAACOM and MTMC. Task Force Rijeka was responsible for offloading and processing the equipment and then for its onward movement to Bosnia, where it is being used to support Operation Joint Forge.



☐Above, equipment of the 1st Cavalry Division debarks from the *Soderman* at Rijeka. Among the more than 800 pieces of 1st Cavalry Division equipment unloaded at Rijeka were 287 containers (right).

Officials expected the offloading, preparation, processing, and movement of more than 800 pieces of equipment to be completed by mid-September. Instead, the 410 soldiers and civilians comprising the 21st TAACOM task force completed the mission almost 2 weeks earlier than forecast, which showcased the capabilities of Europe's only theater-level logistics support command. Major General Mario F. Montero, Jr., the MTMC Commander, praised the Rijeka commercial port operators who dedicated key port facilities and space for the operation. A Rijeka-based company, Jadroagent, provided port operations support and stevedores. The team landing soldiers from 2d Brigade Headquarters and the 91st Engineer Battalion assisted with getting the ship unloaded and all of the division's equipment successfully rail-loaded and moved into Bosnia base camps.

Deploying Equipment From Rijeka to Bosnia

"During the operation at Rijeka, a rail movement management team [RMMT] was deployed with the MCT [movement control team], making a newly combined movement control team," observed Captain Michael J. Smith, the 588th MCT commander. "The combined MCT will set a new standard for the U.S. Army in contingency operations." Added Sergeant Carl Snyder, the railhead's noncommissioned officer in charge, "It has been a great opportunity for the RMMT and the MCT soldiers. They have had an opportunity to learn each other's job." According to Smith, all rail cargo at the port would take 6 days to move, using two trains daily consisting of 32 flatcars.

The shipment into Croatia was a plus for the aviators and saved hundreds of hours of helicopter time for the division's aircraft. From a hastily formed aviation compound, helicopters were prepared for liftoff. Almost hourly, another helicopter completed safety and maintenance checks and lifted off high above the sun-drenched docks and out over the azure waters and blue skies of the Adriatic. Preparing the 29 Black Hawks and 16 Apaches for flight was the direct responsibility both of soldiers with the 1st CAV's 2-227th Aviation Battalion and DynCorp contractors with the 21st TAACOM's 2-502d Aviation Regiment. "It was definitely a good feeling having all the helicopters here ready to go," said Captain Joe Phillips, the commander of Company D, 2-227th Aviation Battalion.

Dismantling Rijeka

On 3 September, the port closed down and the brigade team landing staff relocated to Tuzla. The operation thus was completed in advance of the original mid-September estimate.

"I think it has been a tremendous experience for the soldiers," Wolf said. "I don't think that if you had walked around here and talked to each one of those groups a month ago or 2 months ago . . . that they would

☐A radio frequency link and interrogator (above the building) helped track supplies moving out of the truck gate at the port of Rijeka.

have thought they'd be working together as one team with one purpose in mind, and that is exactly what they did. I had some apprehensions when we first started . . . but we came together as a team with one vision, and that was to move [the 1st CAV's equipment] through the port and onward into the Bosnia area of operations as quickly as possible. And we were able to accomplish that without a lot of problems, to be quite honest. It went very smoothly."

Lessons Learned

A few lessons were learned about conducting AIT operations—

- The railhead site was set up to record the traffic leaving the rail yard. Unfortunately, the only secure location within the perimeter was a guard shack that the rail traffic would pass numerous times as it prepared to roll out. If the site could have been instrumented at an area outside of the perimeter, it would have helped simplify the task of recording the traffic.
- RF tags from Wilmington were not properly loaded with level 6 logistics information, which caused the Transportation Coordinator Automated Command and Control Information System (TC ACCIS) not to provide any commodity data.
- RF tags often were smashed as the containers were being moved around. The new SAVI RF tags will eliminate such problems because they fit between the slots in a container.
- Good information on the movement of equipment with RF tags was available on the World Wide Web. Commands need to make sure that everyone who tracks equipment knows how to access the data on the web.
- Network connectivity was a great asset for access to the web and passage of RF and DTRACS data.
- RF handheld interrogators were available but rarely used. More training needs to be provided to stevedores on the capabilities of this equipment.
- The mission demonstrated that interrogators can be installed and removed quickly to support operations.
- Shipping data for commercial ports need updating in the data base to avoid offending any national sensitivities. Many nations have changed their names or gained independence in recent years, and shipping labels need to reflect the new names and the new countries.

As Bram de Jong, an MTMC public affairs officer, commented, "Cooperation between transportation units and local national port authorities has guided the success of this first-time port operation of moving equipment." "It has been an outstanding operation," General Montero concluded. "Everything is moving. This deployment through Rijeka demonstrated our strategic capability and resolve in using Adriatic ports to support continuing operations in the Balkans." **ALOG**

When this article was written, Major General Charles S. Mahan, Jr., was the commander of the 21st Theater Army Area Command. He previously served as Director for Supply and Maintenance in the Office of the Deputy Chief of Staff for Logistics, Department of the Army, and as commander of the 13th Corps Support Command, Fort Hood, Texas. General Mahan is a graduate of the Quartermaster Officer Basic and Advanced Courses, the Army Logistics Management College's Logistics Executive Development Course, the Army Command and General Staff College, and the Army War College. He holds a B.S. degree from the U.S. Military Academy and an M.B.A. degree from the University of Miami.

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Total Package Fielding for the Abrams Tank

by Major Brian Raftery

The experience of the Project Manager Abrams shows that fielding new equipment requires considerable planning and coordination.

In July 1998, the 1-12th Cavalry Battalion, 1st Cavalry Division, at Fort Hood, Texas, completed new equipment training on the M1A2 Abrams tank with a Tank Table VIII crew gunnery live-fire exercise. This event ended a 3-year process of fielding the world's most sophisticated and lethal main battle tank to the soldiers of the 1st Cavalry Division. However, that process began well before the division's first M1A2's were issued to the 3-8th Cavalry Battalion in 1995. Fielding of M1A2 tanks to the 1st Cavalry Division was a textbook example of total package fielding (TPF). It also illustrates some of the techniques and procedures that we use in the office of the Project Manager, Abrams Tank System (PM Abrams), to ensure that fieldings of complex weapon systems occur successfully and with minimal impact on the receiving unit.

Total Package Fielding

At PM Abrams, our concept of a "fielding" is putting a fully supported operational capability into the hands of the gaining unit at the time of initial fielding. The components of the total package the unit receives include not only the end item itself but also basic issue items (BII), all required special tools and test equipment, a starter set of current publications down to the vehicle level, and class IX consumable and reparable spare parts. The package also includes new equipment training (NET), the expertise of contractor technical representatives or field service representatives, training devices such as the Advanced Gunnery Training System, and, lastly, an unparalleled commitment on our part to provide quality equipment and support to our customer.

Planning

To ensure that all of the components of the total package are ready on the day of issue, planning must begin long before handoff. A successful TPF has its genesis in the integrated logistics support (ILS) process, which parallels materiel development. During this planning phase, assessments are made, generally by the prime contractor, about the logistics impacts and requirements of the new system. This is essential to ensuring that the system is supportable, trainable, and maintainable at the time of fielding.

Two key outputs of this process are the NET program of instruction (POI) and the materiel requirements list (MRL). The NET POI determines which tasks are taught to the receiving unit. The MRL details the items that are required to support the major end item. Additionally, spare parts requirements are forecast, and facility requirements and impacts are assessed. These assessments and MRL's are not handed off on issue day; support packages are.

To ensure that a viable TPF can occur, MRL's must be turned into physical packages (the actual support items issued with the end item), spare part requirements must be turned into authorized stockage list (ASL) packages, and training must be completed. Accomplishing all of this requires resources. For example, the ASL issued to the 1st Cavalry Division is worth approximately $20 million. NET costs also are on the order of several million dollars a year. If these resources are not programmed, they will not be available on issue day. Further, any facility upgrades must be identified and communicated to the gaining unit so it can forecast its re-

☐ **The 2-8th Cavalry Battalion was one of the units of the 1st Cavalry Division receiving the M1A2 Abrams tank.**

quirements for necessary resources. The ILS process is certainly much more intricate than has been presented here. The point is that the process must occur in a timely fashion so that its outputs can be resourced and made available at the same time as the weapon system itself is fielded.

Notification

Proper and timely notification of the gaining command is essential. Generally, issuing a new system involves displacing an existing system, and units need time to prepare for the change. The doctrine and methodology for the notification and coordination process are well defined in AR 700-142, Materiel Release, Fielding, and Transfer, and DA Pamphlet 700-142, Instructions for Materiel, Release, Fielding, and Transfer, and I will not go into detail here. Those documents form the basis for the "doctrinal template" of the notification process. The milestones in those documents are laid out backwards from the projected handoff date, in much the same way that the backwards planning method is used in a tactical operation. This procedure provides a simple way for determining when memoranda of notification, materiel fielding agreements, and materiel fielding plans should be issued to and coordinated with the gaining unit.

The production schedule of the M1A2 has created further coordination challenges. In years past, a brigade's worth of tanks was built in a single month. In 3 months, enough tanks were produced to outfit an entire armored division. This is not the case now. Today, it takes a year to build enough tanks to equip just one brigade. This long timespan, along with personnel turnover, can result in incomplete or ineffective coordination.

To ensure effective coordination, the Abrams Logistics Fielding Branch uses several techniques. The first is the Abrams Worldwide Fielding Conference. In this forum, representatives from the offices of the Department of the Army (DA) Deputy Chiefs of Staff for Operations and Plans (ODCSOPS) and Logistics (ODCSLOG), major Army commands (MACOM's), weapon system managers, gaining unit force modernization and integration personnel, the National Guard Bureau, the PM Abrams Fielding Branch, and others meet annually to discuss current fielding schedules, priorities, and issues. This helps ensure that the Abrams fielding picture is presented on an annual basis to all agencies affected by a future tank fielding.

Another coordination technique is the new materiel introductory briefing (NMIB) conducted with the gaining unit. NMIB's generally start at least 12 to 18 months before the projected handoff date and continue up to the month before issue. The briefings are conducted at the unit's convenience, but frequently enough to ensure that the gaining unit is fully informed about, and comfortable with, the upcoming fielding. NMIB's are presented to the gaining unit by a PM-led team with representatives from the NET team and the Army Tank-automotive and Armaments Command (TACOM) Materiel Fielding Team (MFT). NMIB's describe the new equipment, how the issue will be conducted, and what associated training will be provided.

To ensure that any issues arising out of an NMIB are coordinated and resolved, and to assist the gaining unit with its concerns about the upcoming fielding, multiple in-progress reviews (IPR's) and informal meetings are conducted. These occur as often as necessary to ensure that all problems are resolved before the fielding. IPR's may include members of the installation staff, the MFT chief, the NET team chief, and unit and PM representatives. Positive coordination with the gaining unit and the installation is critical to ensuring that scarce facilities, such as classrooms for training, equipment deprocessing and storage areas, and office space, are available. All of these are required for a system as complex as the M1A2. Multiple IPR's may be needed to ensure that use of these facilities does not conflict with the gaining unit's other missions and priorities. The IPR is a working forum and does not take the place of proper and timely notification of facility requirements.

In addition to continuous coordination with the gaining unit, coordination with the DA ODCSOPS must be maintained to make sure that the fielding schedule does

not conflict with other Army missions and priorities. Redirecting a shipment of tanks is simple; conducting a well-coordinated, synchronized fielding is more difficult. To minimize effects on the gaining unit, allow it time to prepare to receive new equipment, and maintain effective coordination, overall Army fielding priorities must be monitored. Fielding of an item like the M1A2 tank does not occur in isolation from other unit events and missions.

Timely notification and continuous coordination, both down to and up from the gaining unit, are essential to ensuring that the unit is able to receive its new system with minimal impact. Just as in a tactical operation, the executors of the plan need time to prepare properly. Timely notification helps give the unit the time it needs.

Preparation

Once notification occurs, much of the real work of fielding a new system begins. Fielding a system as sophisticated as the M1A2 is a more complex task than setting up a new personal computer. Tanks must be inspected and prepared for issue (or "deprocessed"), TPF packages must be shipped and staged for issue, facility improvements may be required, unit coordination must continue, and training must begin. A variety of tasks must be completed to achieve a successful handoff.

Deprocessing prepares a tank for issue to the receiving unit. Shipping materials are removed from the vehicle, all aspects of the vehicle's operation are checked and verified, and all known deficiencies are corrected to guarantee that it is ready for issue. These tasks are performed by the TACOM MFT and a team of contractor personnel, unit augmentees, and field service representatives from General Dynamics Land Systems resourced by PM Abrams.

In addition to preparing the vehicle for issue, deprocessing provides the gaining unit with its first exposure to the new system. The use of unit augmentees in deprocessing helps develop the institutional knowledge the unit will need to support the vehicle after the fielding. A technique currently being employed at Fort Carson, Colorado, in preparation for fielding the M1A2 to the 3d Armored Cavalry Regiment is the use of installation directorate of logistics (DOL) maintenance personnel to assist in deprocessing. This is a cost-effective means of providing skilled labor, furnishing access to excellent facilities, and preserving skills; it also helps to develop institutional capabilities at the installation level in support of the M1A2. When the fielding team completes its mission and leaves Fort Carson, valuable skills and knowledge will remain behind.

As previously stated, fielding of a complex system such as the M1A2 includes more than just the end item itself. As vehicles are prepared for issue, the support package is assembled and brought forward. All special tools, test equipment, spare parts, technical manuals, and other needed items are prepared for issue. These items are issued before the tanks themselves are issued at a time and place negotiated by the gaining unit and the MFT site chief. Our standard for filling the TPF package is 90 percent of all required items or better, with no mission-critical items missing. Every effort is made to have everything on hand before the issue date.

Other tasks performed in preparation for an M1A2 fielding include upgrading ranges and constructing synchronization ramps. Because of the M1A2's unique capabilities, tank ranges may require slight modifications to target arrays in order to fully challenge and train crews. In addition, the M1A2's sight system requires a simple ramp to ensure that all optical planes are aligned. While the actual upgrading of these facilities is rather simple, the unit and installation need adequate time to plan for them. In the case of upgrades at Fort Hood and Fort Carson, identification of required upgrades was completed at least 18 months before the first M1A2 was issued.

☐ One of the crucial components of fielding a new system is new equipment training (NET). Here, soldiers receive M1A2 driver training from a NET instructor.

Another requirement for preparing for a successful fielding is constant coordination with the gaining unit. This usually is done at or below the brigade level, and after the fielding team is actually present on the installation and after required coordination with higher level installation and MACOM staffs has been completed. Coordination allows any issues arising as a result of the upcoming fielding to be resolved rapidly. Package issue dates and locations, the date and time of vehicle issue, training schedules, and other details are coordinated with the gaining unit. This micro-level coordination also allows the fielding to be tailored to the gaining unit's requirements. The M1A2 NET team and

the MFT strive to provide the gaining unit with maximum flexibility by adjusting the detailed schedule to suit unit needs while still accomplishing the overall fielding mission.

Execution

The culmination of all the planning and preparation is the execution phase of the fielding. Execution starts on issue day, which in most cases has been agreed upon by both the unit and the PM, and ends, at least formally, 2 months later with the completion of NET. The execution phase consists of vehicle issue and inspection, operator NET (OPNET), organizational maintenance NET (OMNET), and gunnery.

M1A2 tanks are issued over a 1-week period in four company/troop sets that constitute a battalion/squadron set. Before the day of issue, the MFT pre-positions the deprocessed vehicles, with their BII, for the gaining unit to draw. The first step in the issue process is the tank and BII inventory. Our standard is that the tank with its BII should be 100 percent complete on issue day. All shortages should be filled on the spot. Where this is not possible, every effort is made to obtain the missing items before the tank is used; in one situation, BII shortages were located by Abrams logistics personnel and shipped overnight to the unit so that all BII items were on hand. Following the inventory, the unit commander signs for the equipment on hand receipts provided by the MFT and then sub-hand-receipts the tank and its BII to the crew.

With the inventory complete, the unit then performs the acceptance technical inspection. Because the crews have not yet been trained on the new system, each crew is assigned an M1A2 NET instructor. This instructor, who will remain with that crew throughout NET, assists the crew in performing the technical inspection in accordance with the standards in the vehicle –10 technical manual. Any deficiencies noted in this inspection are corrected by MFT personnel. Deficiencies requiring further examination are corrected, at no cost to the unit, before the end of NET. After all deficiencies are corrected, the unit commander is issued the vehicle log books and accompanying documents. He then moves the unit to the motor pool in preparation for NET.

M1A2 NET serves three important purposes. First and foremost, it trains the crew on their new vehicle. NET also helps train unit and direct support mechanics as they support a battalion through OPNET and a full tank gunnery. Lastly, NET serves as a final quality check on the vehicle. PM Abrams funds all class IX costs through the NET Tank Table VIII exercise. This ensures that the cost of components that fail as a result of the rigors of NET and tank gunnery are not borne by the unit.

M1A2 OPNET trains crews on aspects of the M1A2 that differ from the M1A1's they turned in. In some cases, these differences are significant. Crews alternate between classroom and on-vehicle instruction. In the classroom, crews are trained on computer-based crew station trainers, which replicate the key soldier-vehicle interface functions of the tank and allow rapid instruction of the entire crew on each crew station. These skills then are reinforced by working on the actual vehicle. OPNET concludes with a mounted position navigation (POSNAV) exercise. At the conclusion of OPNET, tank crews are prepared to start the gunnery portion of M1A2 NET.

M1A2 NET gunnery trains crews on M1A2 gunnery skills. Crews progress through the basic tank gunnery tables and ultimately fire a full-up Tank Table VIII. At the conclusion of gunnery, all tank crews in the battalion or squadron are M1A2 qualified.

NET and gunnery also stress the M1A2's support infrastructure. Throughout the training, the tanks are supported by the unit's own organizational and direct support mechanics, who previously were trained during OMNET or direct support/general support NET in conjunction with the unit field service representative. The field service representative provides technical expertise and helps train mechanics on the technical aspects of the M1A2. NET and gunnery serve as a valuable "hands on, at no cost" exercise for the unit's maintenance staff and are an important dimension of the TPF.

Although the conclusion of NET gunnery marks the end of the formal part of an M1A2 fielding, it does not mark the end of PM Abrams' commitment to the user and the quality of the M1A2 and its ability to meet user needs both during and after fieldings. In situations where certain components experience higher than expected failures, we have increased ASL quantities at no cost to the unit; in other situations, we have provided free replacements for parts that did not meet expectations. In addition, at the request of the 1st Cavalry Division, we participated in a formal after-action review process and followed up aggressively on resolving issues that the unit had with the tank that are our responsibility; we continue to do so. Through such close coordination and teamwork with the gaining unit, we have been better able to tailor both the equipment and the fielding process to meet the user's needs and the Army's fielding priorities. **ALOG**

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Deployment and Civilians: What Incentives Do We Need?

by Jody Brenner

With civilian employees playing a growing role in deployments, the author argues that they deserve a pay and benefits package that is both rewarding and motivating.

Civilians have supported military operations since the founding of the United States. With each successive war, their contributions have increased as they work in supply, transportation, engineering, maintenance, communications, and medical support. During Operations Desert Shield and Desert Storm, 2,000 Army civilians deployed to Saudi Arabia, where they performed functions ranging from repairing equipment to contracting for supplies.

The Persian Gulf War demonstrated that we cannot be sure when and where the next conflict will occur. Since that war's conclusion, Army civilians have been involved in numerous contingency operations, including Hurricane Andrew relief (101 Army civilians deployed) and Operations Restore Hope in Somalia (32), Vigilant Warrior in Kuwait (169), Uphold Democracy in Haiti (74), and Joint Guard in Bosnia (252). It is projected that in the future the Army will rely even more on the use of civilians during contingency operations because of the downsizing of the military forces.

Because the need for civilians to deploy in support of future contingency operations only will increase, it is important that civilians be motivated to perform with the same dedication as soldiers. It is vital that a pay and benefits plan be provided to civilians that will encourage them to volunteer to deploy in support of our forces. However, if the Gulf War illustrated the growing importance of civilians, it also revealed shortcomings in their pay and benefits plan. These shortcomings still exist. The current pay and benefits plan provides very little incentive for civilians to volunteer for contingency operations.

Areas of concern affecting the pay and benefits of civilians include the overtime pay rate, tax exclusion, annual leave, life insurance, and a bonus plan. I would like to examine each of these areas, as well as present a couple of alternative bonus plans, all with the idea of developing a total benefits package for deploying Army civilian employees.

Overtime Pay

A General Schedule (GS) employee whose basic rate of pay does not exceed that of a GS-10, step 1, will be paid at a rate of 1½ times his basic hourly rate for each hour of work authorized and approved over the normal 8-hour day or 40-hour week. An employee whose rate exceeds that of a GS-10, step 1, will be paid at the rate of 1½ times the basic hourly rate of a GS-10, step 1. This creates a problem, because most employees who currently participate in contingency operations are GS-11's and -12's.

Obviously, this payment plan offers little motivation for employees graded GS-12 and higher to work overtime during a contingency operation. For example, under the current plan, a GS-12, step 10, is paid an overtime hourly wage of $25.41, which is less than his basic hourly pay rate of $29.01.

This situation should be corrected by paying overtime at the rate of 1½ times the basic hourly rate for all employees. This corrective action would benefit all employees who are GS-10, step 2, and above. For our hypothetical GS-12, step 10, employee, overtime pay would increase to $43.52 per overtime hour worked (1½ times his basic hourly rate). The proposed overtime pay plan would motivate civilians to volunteer to participate in contingency operations because they will be compensated fairly for working overtime hours.

Tax Exclusion

The current payment plan for civilians does not provide a tax exclusion for wages earned during contingency operations designated as combat situations or national emergencies. The military officers who deployed to Bosnia in support of Operation Joint Guard received a tax exclusion of $4,254.90 per month. A tax exclusion for civilians would be a strong motivational factor for civilians to participate voluntarily in support of contingency operations.

A logistics assistance representative (LAR) told me in an interview that the tax exclusion is the biggest issue of concern in the LAR community. He explained that he earned more than $10,000 in additional income due to overtime, danger, and foreign post differential pay while he was deployed to Bosnia during 1997. This additional income placed him in a higher tax bracket for that year. He concluded that the payment of additional taxes made him reconsider the overall worth of working 7 days a week and 12 hours a day to earn extra income.

The absence of a tax exclusion might be the reason for one group in particular to decide against volunteering for contingency operations: civilian employees who have spouses with well-paying jobs. These employees would have no incentive to volunteer for deployment because the additional funds they earned would place them in a higher tax bracket. They therefore would be working long hours in a hostile environment only to receive a very minimal reward.

Civilians in Bosnia are performing functions just as important as those of the soldiers. Rewarding soldiers with a tax exclusion and not providing a similar tax exclusion for civilians is bad for morale. Military officers and civilians are on the same team and are attempting to achieve the same goals. The absence of a tax exclusion for civilians could have a divisive effect on the total force. For example, civilians who are upset about the lack of a tax exclusion might perform at an average pace and allow extra duties to become the responsibility of soldiers. This could create animosity against civilians in some soldiers.

A tax exclusion that had been under consideration by Headquarters, Department of the Army, would have given civilians deployed to support combat situations and national emergencies a $500 tax exclusion. This tax exclusion would not have been fair and equitable. For example, consider a GS-12 who recently deployed to Bosnia. This individual could possibly earn approximately $55,000 in the 6 months that he is deployed. (I arrive at this figure by assuming that a GS-12 earns approximately $50,000 per year and that foreign post differential and danger pay amounts to 40 percent of base pay. I also assumed that the individual worked 28 hours of overtime per week.) A $500 tax deduction on total wages of approximately $55,000 would not have helped the employee reduce his taxable income.

[Editor's note: Since this article was written, the Army has taken further steps to address the problem discussed by Mr. Brenner. The Army's current legislative proposal requests a tax exclusion equal to the amount excluded for enlisted personnel, currently $4,653.]

I believe that a tax exclusion of 60 percent of the total wages a civilian earns while deployed should be implemented as soon as possible. At 60 percent of total wages, a GS-12 would have a tax exclusion of approximately $33,000 for a 6-month period. This would be approximately $5,500 per month. Remember that this is just an approximation, but a 60-percent tax exclusion could be distributed equitably among the variously graded employees who participate in deployments. The implementation of a 60-percent tax exclusion would greatly motivate civilians to volunteer to participate in contingency operations.

Those individuals with spouses earning a substantial income would be more inclined to take part in deployments. They could lower their total taxable income rather than raise it and thus would enjoy more disposable income. A single civilian who has numerous investments in addition to his Government salary would give serious consideration to participating in deployment operations because of this generous tax exclusion.

It is difficult to estimate the number of civilians who would consider volunteering to take part in deployments because of this tax exclusion, but I think the number would be substantial. A survey of a group of civilians who regularly take part in contingency operations, such as LAR's, could provide more solid data. I believe the LAR community would be very receptive to this tax exclusion. (It should be noted that contractors receive a tax exclusion of $72,000 while employed in a foreign country.)

Annual Leave

According to the Department of the Army Civilian Employee Deployment Guide—

> Any annual leave in excess of the maximum permissible carry over is automatically forfeited at the end of the leave year. Annual leave forfeited during a combat or crisis situation that has been determined by appropriate authority to constitute an exigency of the public business may be temporarily restored. However, the employee must file for carry over. Normally, the employee has up to two years to use restored annual leave.

Civilians currently are limited to carrying over 30 days of annual leave from one year to the next. An LAR supports his unit during all contingency operations, of which there have been a number since Desert Storm. It therefore is possible that an LAR would have to file to carry over leave every year and would eventually lose annual leave because of the 2-year time limit on using restored leave.

The policies of mandating that an employee file to carry over leave and limiting the carry-over time period to 2 years are too restrictive. These restrictions could dissuade individuals from participating in contingency operations. Most people do not like to do any additional paper work unless they are forced to do so.

I suggest three actions to correct the annual leave carry-over problem. The first would allow the employee to sell to the Government additional hours or days of annual leave accumulated above the 30-day limit at the end of the year. This "sell back" feature would be very attractive to individuals who were deployed for most of the year, and the payment of money would serve as a small bonus for their efforts during a contingency operation. The Government essentially does the same thing for employees at retirement, by paying the retiring individual for his balance of annual leave.

The second corrective action would allow employees to transfer the additional annual leave hours into their sick leave totals. This would be especially advantageous for civilians who deploy with regularity. It is common knowledge that, as the number of contingency operations in which an individual participates rises, the greater are his chances of injury or sickness. An accumulated sick leave account would provide the employee with a fairly secure safety net in the event of sickness or injury.

The third corrective action would change current policy to allow employees who participate in contingency operations to carry over annual leave for a 2-year period without filing to carry it over. At the expiration of the 2-year period, the employee would be given the opportunity to sell the excess annual leave hours to the Government or transfer those hours into his sick leave account.

Life Insurance

A civilian who has a life insurance policy with a private insurance carrier often is at a distinct disadvantage during a contingency operation. If the operation turns into a conflict or war and the civilian is killed, it is highly probable that his policy will be null and void due to a war clause. This is not a remote possibility: Operation Desert Shield started out as a contingency operation and quickly became a war. Considering the number of contingency operations since Desert Storm, such a scenario easily could happen again. If a civilian who has a policy with a private insurance carrier is killed, his family may have no recourse for collecting insurance money upon his death.

The only option that an individual in this position has is to spend additional money to purchase a policy through Federal Employees Group Life Insurance (FEGLI). Such a policy does not contain a war clause, and death benefits are payable regardless of cause of death. However, civilians who have an insurance policy with FEGLI can change their amounts of coverage only once a year, and changes are not permitted before deployments.

I have two suggestions for corrective action for civilians who have life insurance policies with companies other than FEGLI. The first would change Government policy to authorize the payment of any amount of an insurance policy that is not paid because of a war clause. Upon application by a beneficiary, the Office of the Secretary of Defense would investigate the claim and, if valid, would certify the claim and forward it to the Secretary of the Treasury for payment from the General Treasury. If approved, this corrective measure would be a big motivating factor for civilians who have not volunteered to participate in contingency operations because of their life insurance dilemma.

The second corrective action would be for the Government to pay for life insurance coverage with FEGLI as long as the individual is actively participating in contingency operations. The Government could provide this benefit to an employee for a given time period, after which it would be the employee's responsibility to pay for the life insurance coverage himself. This approach would show the Government's appreciation for the employee's participation in contingency operations. If implemented, this change will have a substantial impact on a large number of civilians who have not chosen to participate in deployments because they could not purchase life insurance or increase their coverage before deploying. An individual would be more inclined to

participate in deployments if he knew for sure that, in the event of his death, his spouse or heir would receive his life insurance benefit.

Bonus Plans

I would like to discuss two possible bonus plans to encourage civilian participation in contingency operations. Bonus plan one would require civilians to commit to participate in contingency operations for a 3-year period. A maximum number of contingency operations in which a civilian might have to participate would be identified for this period. A pre-established bonus based on grade level then would be invested in the Thrift Savings Plan by the Government. The employee would have the right to select the specific funds in which he wanted to invest his bonus. If an employee failed to participate in a contingency operation for reasons other than sickness, or if he left the deployment area without permission, he would forfeit all of his invested bonus money. At the end of the 3-year period, the employee could receive his total bonus compensation and would be given the opportunity to sign up for another 3 years. If he did sign up for another 3 years, he would be given the choice of withdrawing his accumulated bonus or leaving it in the investment fund.

The biggest advantage to the Government under this bonus plan would be the retention of a highly motivated and dedicated work force. This system also would contribute to continuity of logistics operations because the same individuals would be available for a 3-year period. The biggest advantage to the employee would be a guaranteed bonus based on his grade that would be invested in the Thrift Savings Plan (a proven sound investment). He would have a bonus that he could either use in 3 years or reinvest if he signed up to participate in contingency operations for another 3 years. Some employees probably would continue to commit to participate in contingencies until they retired and thus would use their bonus money as additional retirement income.

The only two disadvantages of this bonus system would be that an employee would have to wait 3 years to take possession of his bonus money and that he would have to make a commitment to the Government to participate in contingency operations for 3 years.

Bonus plan two would offer a flat-rate bonus to all civilians regardless of grade upon successful completion of a contingency operation. The employee would forfeit the bonus if he left the deployment area without permission. This plan would be advantageous to the civilian because he would be paid his bonus upon completing his tour of duty and he would only be committed to participate in the current operation. However, this plan would not be advantageous for the Government. The Government would have a continually changing work force for every contingency. The United Nations has used this flat-rate bonus approach and has had a difficult time filling higher skilled and supervisory positions.

I believe that the best deployment incentive benefit package for civilians during contingency operations is one that incorporates bonus plan one. Such a package would provide improvements in the areas of—

- Overtime pay, by paying overtime at the rate of 1½ times the basic hourly rate for all employees.
- Tax exclusion, by excluding taxes on 60 percent of the total wages a civilian earns while deployed.
- Annual leave, by allowing employees to sell to the Government additional hours or days of annual leave accumulated above the 30-day limit at the end of the year; allowing employees to transfer the additional annual leave hours into their sick leave totals; and allowing employees who participate in contingency operations to carry over annual leave for a 2-year period without filing to do so.
- Life insurance coverage, by authorizing Government payment of any amount of a policy that is not paid by an insurance company due to a war clause; and authorizing the Government to pay for life insurance coverage with FEGLI as long as the individual is actively participating in a contingency.

The bonus plan in this package—my bonus plan one—would be mutually beneficial to the Government and the civilian employee. The employee would be paid a bonus each year based on his grade, and the bonus would be invested in the Thrift Savings Plan. In return, the employee would be required to make a commitment to the Government to participate in contingency operations for a 3-year period. This package would allow the Government to retain the most dedicated and skilled people, while at the same time rewarding those people for their efforts during contingency operations. **ALOG**

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Revolutionizing Military Logistics: A New Look at an Old Capability

by Lieutenant Colonel Carl J. Cartwright and CWO3 Linda J. Schwartz

By doctrine and by tradition, the mission of a general support (GS) maintenance company is, as its name implies, to provide GS maintenance for conventional heavy and light equipment end items and components so they can be returned to the theater army supply system. It also provides area maintenance support, to include technical assistance, onsite maintenance, and backup direct support as needed. The unit's size, complexity, and lack of mobility positions it to the rear of an operational theater, where it normally is assigned to an area support group.

Now technology and mobility have given the traditional GS maintenance company a new capability to project its maintenance services forward in the corps area. Highly skilled maintenance technicians who once were restricted to operating in semifixed facilities now can work as modular maintenance teams and bring an "intellectual, theory-based" capability to the battlefield.

Joining the Revolution

As the Army continues to experiment and transition toward the Force XXI organization, the 13th Corps Support Command has joined the Revolution in Military Logistics by seeking innovative employment of the GS assets of the 190th Maintenance Company, 544th Maintenance Battalion, 64th Corps Support Group (CSG), Fort Hood, Texas. This unit is concentrating on refocused missions that will allow them to provide modular maintenance support forward. Through limited changes in organization and tools, the 190th began a mission transformation over 2 years ago that continues to give III Corps capabilities not possible with existing direct support units.

Electronic Repair Shelter

The emerging electronic repair shelter (ERS) program evolved after the Army Audit Agency identified a shortfall in the 190th's ability to diagnose and repair printed circuit boards in the field. In 1996, the 544th Maintenance Battalion, in coordination with the Program Manager-Test, Measurement, and Diagnostic Equipment, received the Army's first prototype ERS as part of a user assessment. With this new capability, the 190th repaired over 685 circuit cards from August 1996 through June 1998, with a cost avoidance of over $1.5 million for III Corps at Fort Hood.

During the 1998 64th CSG Lifeline field training exercise, the ERS proved its worth as a rapidly deployable

☐ The electronic repair shelter provides the capability to diagnose and repair printed circuit boards in the field.

☐ The 190th Maintenance Company's former communications equipment repair section now upgrades 386, 486, and early model 586 NDI computers to Pentium II 586 computers.

system when it was used to modify circuit cards in newly fielded M1A2 Abrams tanks of the 1st Cavalry Division. After a 1-year shakedown period was completed, the first production model ERS was fielded to the 190th in June 1998.

There are literally tens of thousands of circuit cards in the Army supply system. The 190th currently has the capability to repair over 169 different cards supporting the M1A1 tank, M2 Bradley fighting vehicle, AN/TPQ–36 and –37 radar systems, the single channel ground-air radio system, AN/TTC and TYC–39 radios, and digital group multiplexer communications equipment. The capabilities of the ERS are limited only by the number of diagnostic test program sets available. The ERS has great potential as more test program sets become available and special repair activity authority is granted.

Equipment Upgrade

A second capability allowing the 190th to support forward is the company's computer upgrade program. The 190th reorganized their communications equipment repair section and its staff of terminal device repairers into a section that focuses on the upgrade of 386, 486 and early model 586 nondevelopmental item (NDI) computers to Pentium II 586 computers. Nearly 1,000 computers have been upgraded to date, saving III Corps over $295,000.

This work can be accomplished from garrison or an electronic repair van in a field location. The concept includes onsite quality control and warranty work. In short, we're training a generation of soldier repairers to upgrade or repair NDI computers. As we move forward with digitization and increase our reliance on information and information processing, this fully deployable repair capability could be a combat multiplier in future operations.

Repair Versus Replace

A third major capability of the 190th is its ability to perform "onsites" and restore readiness by repairing rather than replacing engines or transmissions for three key battlefield systems. The 190th mechanics' have an in-depth knowledge of the M1 tank's transmission and the engines of the heavy, expanded-mobility tactical truck and high-mobility, multipurpose, wheeled vehicle, so they often can isolate the problem within the component and "fix forward" rather than replace the major assembly.

This concept already has paid dividends for III Corps. With over a dozen onsite visits by Fort Hood mechanics during the last fiscal year, the company avoided the cost of replacing over $1 million in components. Soldiers in the 190th currently are training to perform GS repair of the M2/3 600-horsepower engines to expand their onsite capability.

This article addresses only a few of the capabilities of the 190th Maintenance Company—three deployable maintenance packages that could have immediate impact on the readiness of a deployed force. The 190th Maintenance Company is truly versatile and, in this age of modular deployments of maintenance capabilities, has tremendous readiness pay-off potential. **ALOG**

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Future Operational Capabilities

by Charles Holmes

What capabilities must the Army have to fight in the future? The answer is provided by the requirements determination process, which brings together the combat developer and the materiel developer.

The Army's fundamental mission is one of the few real constants in an ever-changing world. To put it briefly, the Army's mission is, and always has been, to provide the Nation with a competent and poised force that is prepared to deploy on any battlefield, at any time, and in the end come away with the decisive victory. Today's force must be as effective and efficient as any the United States fielded in the past.

Certainly, the battlefields on which the Army fights, the adversaries it faces, and the ways and means it uses to perform its mission have changed over time. But these changing circumstances, when coupled with the Army's unchanging fundamental mission, only serve to heighten the Army's obligation to continue its role as the world's premier fighting force. The Army always has recognized that it has little influence over what adversaries it may face or, in many cases, on what battlefields it may fight. However, choosing the ways and means of accomplishing its mission does fall within the circle of what it can influence.

The most pertinent question that the Army faces today, asked both within its own ranks and by interested outside parties, is, "What is the best way to leverage evolving technologies and deliver needed future capabilities to the soldier?" The ongoing trends of Department of Defense downsizing (in both materiel and personnel) and budget cuts are leading the Army and the other Services to revise the processes by which they obtain what they need to defend the Nation.

Determining What the Warfighter Needs

To obtain the ways and means for performing the specific missions established by doctrine, today's Army depends on an established requirements determination process. This will remain true for the targeted future and beyond. During the Cold War, the Army determined how it would execute its mission (the ways) by first identifying the capabilities of its adversary. Based on an understanding of what the adversary could do, the Army could determine what resources, systems, and people (the means) were needed to execute its mission. This guiding principle changed with the demise of the Soviet Union. The task of finding another method of determining the Army's needs became imperative.

The Army's innate desire to perform its mission in the most cogent and pragmatic way possible led to a new way of defining desired capabilities. What has resulted is a holistic approach to determining horizontally integrated requirements, based on warfighting capabilities identified by the Joint Staff and defined by the Army. This contrasts with the requirements determination process driven by adversary deficiencies. The user—the combat developer—targets desired capabilities to meet new and evolving threats.

Future Operational Capabilities

The revised method of determining requirements depends entirely on the overarching warfighting concept defined in TRADOC (Army Training and Doctrine Command) Pamphlet 525-5, Force XXI Operations. This concept provides a broad view of how the Army will perform its mission; the responsibility for defining the specific ways and means of executing that mission falls to the combat developer community. The method used by the combat developer community is the future operational capability (FOC).

FOC's are developed by the combat developer in conjunction with the materiel developer to describe the re-

quired capability for responding to a targeted aspect of the mission. FOC's are the single existing control mechanism of the entire requirements determination process that identify the capabilities that are needed to perform the combat developer missions. These FOC's are described in TRADOC Pamphlet 525-66, Future Operational Capability (previously titled Operational Capability Requirements), which provides a cross-reference for all required capabilities supporting the approved warfighting concepts. TRADOC updates this document annually, although the combat developer writes and approves FOC's as appropriate.

TRADOC Black Book #3, Requirements Determination, states, "Requirements not related to this blueprint (the requirement determination process employing direct linkage to an approved FOC) are not and will not be resourced." To the combat developer and materiel developer communities, this means that the following items must be directly linked to an approved FOC: every project, operational requirements document (ORD), concept experiment program (CEP), Advanced Concepts and Technology Program (ACT II), Warfighter Rapid Acquisition Program (WRAP), warfighting experiment, and part of the science and technology research and development process (research, development, and engineering center- and laboratory-produced work packages and science and technology objective candidates)—in short, everything the Army does related to determining requirements and delivering capabilities.

The TRADOC Commander, together with the Chief of Staff of the Army, stands squarely in support of the FOC's, the FOC developmental process, and the important role FOC's play in establishing the requirements for near-, mid-, and far-term operational capabilities. Combat and materiel developers therefore must have a functional understanding of the FOC's. The FOC's themselves are as essential to combat and materiel developers as daily rations are to soldiers in the field.

The initial step in understanding FOC's is understanding the current process of determining warfighting requirements. In a preface to Black Book #3, the Chief of Staff of the Army gave the TRADOC Commander the authority to drive changes in the requirements determination process—

> I have directed the TRADOC Commander to chart the course for the Army to follow into the 21st century. Accordingly, the TRADOC Commander will approve all Army warfighting requirements prior to their submission to the Department of the Army (DA). All Army commanders and the Army staff will support the TRADOC Commander in this most important mission. If a need is identified that has any potential warfighting impact or utility, follow the procedures he establishes to determine and document requirements.

The TRADOC Commander went right to work revising or eliminating outdated regulations and policies. This effort is outlined in Black Book #3—

> . . . this pamphlet provides an introductory overview of the way warfighting requirements will be determined, documented and approved . . . [It] explains the new multifaceted, experimental process that has evolved from the Concept Based Requirements System that served us so well. . . . [the new process] documents the relationship of the user representatives who determine DTLOMS (doctrine, training, leader development, organization, materiel, and soldier) requirements—battle labs, combat developers, trainers, doctrine writers—and their linkages to the organizations that produce and field solutions.

FOC's spring fully grown from the operational concepts of the proponent combat developer. TRADOC documents the approved concepts in the TRADOC Pamphlet (TP) 525 series. A few of the concepts documented so far are TP 525-13, Army Band; TP 525-32, Potable Water; TP 525-53, Combat Service Support; TP 525-70, Battlefield Visualization; and TP 525-60, Space.

The number of FOC's submitted for inclusion in TP 525-66 by the combat developers tends to increase annually, mirroring the advances of technology and evolving doctrine. The combat developer community submitted over 600 FOC's in 1997. FOC's focusing on similar desired capabilities are integrated by the combat developer community with FOC's seeking unique capabilities for a targeted user. The pamphlet accords both of these products special recognition. The 600-plus proposed FOC's resulted in the designation of 57 integrated and 29 branch-specific (unique) FOC's.

Improving the FOC Process

Today, the FOC developmental process is evolving in response to rapid changes in technology and doctrine. This process of FOC evolution is a function of the combat and materiel developer communities embracing change. It will enable the combat developer to better articulate his desired capabilities and the materiel developer to better pursue and deliver mature, technology-based capabilities that meet the combat developer's requirements and push the "technological envelope."

The existing FOC format provides a generic description of the capabilities required to support a particular aspect of a defined mission. However, the materiel developer community has expressed a need for better defined FOC's that contain an increased level of specific information. They want FOC's that can answer succinctly the following questions: What is the objective of the desired capability? What is the supporting doctrine/operational concept? Is there a desirable de-

Unmanned Systems, US-YY-001

1. Principle objective: Expand tactical reach of mounted combat forces with unmanned systems.
2. Principle operational baseline: Current mounted cavalry scout mission.
3. Key and enabling elements (w/supporting objectives as applicable)
   - Lethality: By 2010 increase lethal range by 10-15 km, by 2020 increase by 10-50 km.
   - Survivability: Decrease manned system losses (casualties) by 3-5 times NLT 2010, by 10 times NLT 2020.
   - Mobility: 1) Increase force tactical movement rates by 25% by 2010, by 50% by 2020; 2) No increase or reduction in strategic lift.
   - C4I: 1) Increase areas of regard and influence to 15 km NLT 2010, 25-40 km NLT 2020; 2) Increase ability to identify friendly unit/system location with 90% accuracy, and enemy unit/system location with 80% accuracy NLT 2020; 3) Interoperable with C4ISR systems.
   - Sustainment: No unique prime mover or support vehicles.
4. DTLOMS considerations: T - Must have embedded training; O – Must be predominantly organic at Brigade and Battalion level.
5. Warfighting concepts of operation linkages: Future cavalry forces will perform recon and security missions at increased ranges and across broader sectors, but with fewer personnel and vehicles. They must be able to assist in developing the common picture of the battlefield with greater accuracy and speed (reference 525-series).
6. Other considerations: Potential for use in clandestine joint and coalition force operations.

☐ **This is an example of a future operational capability.**

livery milestone? What is the metric used to determine success? Is there an area of materiel focus that complements existing battlefield operating systems?

The combat and materiel developers acknowledge that the success of any change in FOC format depends directly on several factors: the existence of an approved and viable operational concept that addresses the proponent's area of interest; a decrease in the number of proponent-submitted FOC's; an increase in the level of content specificity, which requires improving combat developer-defined desired capabilities; and a process that encompasses the developmental and evolutionary aspects of identified technologies while addressing near-, mid-, and far-term combat and materiel developer concerns.

A subsequent review of the format and developmental process for FOC's showed that the user's operational concepts were not documented completely, that the FOC's did not do the best job of focusing the efforts of the technology base, that there were too many proponent FOC's, and that the level of specificity of users' identified needs had to be increased in order to obtain desired capabilities.

TRADOC is in the midst of reformatting the content and intent of the FOC's. The result will be designated a "corporate" FOC. Corporate FOC's will represent the operational and functional concerns of the combat developer proponent of the various operational mission areas. The new format will identify desired improvements and advances in established operational capabilities that have been designated as "required" under approved concepts and doctrine. Corporate FOC's will result in near-, mid-, and far-term capability solutions for the Army.

TRADOC Pamphlet 71-9, Requirements Determination, contains the latest format for FOC's. This format is under review, and new FOC developmental guidance is pending from Headquarters TRADOC.

There are 77 combat service support/logistics FOC's listed in the 1 May 1997 edition of TRADOC Pamphlet 525-66. These FOC's cover diverse subjects, ranging from religious support projection to articulated railcars. Each of these logistics FOC's addresses a specifically focused aspect of the Army's logistics mission and in turn the Army's overarching, holistic mission. The commanding general of the Army Combined Arms Support Command has articulated the combat service support/logistics vision. That vision calls for a single logistics operator, a maximized logistics throughput, a minimized logistics footprint, and the proliferation of anticipatory and predictive logistics.

Understanding the role FOC's play in the Army's requirements determination process and developing FOC's that effectively articulate the combat developer's needs ensures the Army's success in performing its mission and provides access to the Army of the future. **ALOG**

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Commentary

An Argument for a Combat ASL

by Thomas R. Welch

Can the Army's streamlined authorized stockage lists still support a force that increasingly is asked to deploy rapidly around the world? The author has doubts, and offers a solution.

The bottom line, up front: our early deploying units need a pre-positioned combat authorized stockage list (ASL) level of supplies. We have entered an era in which the Army increasingly relies on rapid deployment elements to engage in combat or operations other than war (OOTW). I am concerned that our supply processes are evolving to a point where our Army soon may not be able to rapidly deploy a fighting force that is equipped logistically to survive until supply trains are established to provide replenishment support. Let me share what has drawn me to this belief and how I think we can change the process. (In writing this article, I base my argument on several assumptions that I consider reasonable.)

Army Initiatives Lead to Reduced ASL's

The end of the Cold War precipitated a rapid decline in the Army's logistics budget. This has happened while the Army's involvement in OOTW has increased dramatically the number of locations to which it may have to deploy rapidly. At the same time, reduced budgets have caused us to "streamline" our prescribed load lists (PLL's) and ASL's.

By directive of Headquarters, Department of the Army (DA), our PLL's have decreased from 300 to 150 demand-supported lines. (I should note here that many of our commanders report PLL's in the 20-line range. The reasons for this are reduced funds, reduced order ship time [OST], or both.) Additionally, the Velocity Management initiative to reduce OST has allowed us to reduce our peacetime OST's across the continental United States, and certainly within Forces Command (FORSCOM) active component units and installations, by more than 50 percent. (See the chart below.)

Division	December 1994	December 1998
3d Infantry Division (Mech)	30.9	8.7*
82d Airborne Division	31.7	7.4*
1st Cavalry Division	20.1	9.4*
101st Airborne Division	21.9	6.8*

*1 day added to installation OST to reflect division OST. Without back order.

☐ The average order ship times in days for these divisions based in the continental United States have been reduced by over 50 percent. Such reductions have led to cuts in ASL levels.

Reduced OST correlates to a decrease in ASL levels. Data extracted from FORSCOM's Total Inventory Management Program show that in December 1994 four FORSCOM active component divisions had total ASL requisitioning objective (RO) levels of $151.6 million dollars, with $99 million dollars on hand. At the end of the first quarter of fiscal year 1999, these same divisions had RO levels of $107.7 million, with $75 million dollars of inventory on hand. This represents about a 30-percent reduction in ASL requirements and about a 25-percent reduction in ASL on-hand assets. I cannot say that ASL's in other divisions and nondivisional units have decreased a like amount, but I believe we can agree that an ASL reduction definitely has occurred.

Let's look at another Velocity Management initiative. The Army Combined Arms Support Command, at Fort Lee, Virginia, is developing a "cost banding" initiative in conjunction with the Army Logistics Integration Agency (LIA) and RAND Corporation. (Most likely it will be developed by the time this article is published.) What is cost banding? The concept is that OST has been reduced sufficiently so that commanders now can accept the "risk" that essential supplies will arrive from wholesale depots or wholesale contracted prime vendors "just in time." Therefore, investment in a "full up" ASL RO is not necessary. Applying this concept Army-wide to reduce ASL costs is likely, in

my opinion, to cause divisional and nondivisional ASL levels to be reduced by half again.

Nothing demonstrates this better than the cost banding test conducted by LIA in conjunction with the 101st Airborne Division (Air Assault) at Fort Campbell, Kentucky. There, a conscious decision was made to stock fewer high-cost repair parts and more low-dollar-value repair parts. This enabled the 101st to reduce the dollar value of their ASL by $9 million—a whopping 50-percent decrease. If we apply cost banding to the three other divisions in the chart, we likely could reduce their ASL's by another $18.4 million, and so on across FORSCOM. (However, the actual amount of the reduction will be determined by the commander on the ground.)

In addition to the above initiatives, the Army Materiel Command and the Defense Logistics Agency are developing processes such as Direct Vendor Delivery and Prime Vendor, which are designed to decrease the stockpiles of repair parts currently in storage depots. Though these initiatives could, and likely will, save money, this step could seriously impair our ability to deploy under existing time constraints. While these initiatives are smart business approaches to conserving dollars during peacetime, they create deployment risks that may be too high.

Reduced ASL's Create Risks

Thus, I pose the question, "Will the streamlined PLL's and ASL's meet mission objectives until the supply trains have been established?" Based on the timelines by which our early deployers currently must be out of the gate and the time it takes to request, ship, receive, and upload stock, I suggest they will not. Even if wholesale depots can ship all required stocks, and those stocks arrive at the installation overnight, our early deploying units still will be unable to upload a full ASL onto prime movers in time to move out the gate under the required time restrictions. This means one of three things: we move our units with virtually no PLL and a streamlined ASL; we wait until requirements arrive; or we pick up our requirements in the area of operations.

In any scenario, we will be giving the enemy a clear potential for deeper entrenchment or penetration. Let's take a case in point. During the war in Southwest Asia, with the lengthy buildup period before the start of Operation Desert Storm, the wholesale supply system was able to provide the supplies we needed. What we did not have on hand before actual deployment began, we picked up in the area of operations. The problem was similar to Vietnam, when we had everything we needed in port but knew where nothing was located. So our soldiers literally searched through an iron mountain until we found what we needed. In fact, I recall reading a previous article in *Army Logistician* that stated that the Army had to open 22,000 of about 40,000 containers at various supply and transportation points in Saudi Arabia just to determine their contents and intended recipients. (Okay, radio frequency tag technology is expected to solve the problem of identification for us, provided the system is operational when we need it. However, the supplies still need to be bulk-broke and transshipped.)

ASL Pre-positioned for Combat Is Needed

Assuming that the on-hand peacetime PLL and ASL will not sustain our early deployers, it becomes clear that we need a pre-positioned combat ASL. I believe we have the tools to develop and establish one. However, nothing is ever easy. As always, there are issues affecting the development of a pre-positioned combat ASL that must be addressed. There may be more, but I can think of four issues to consider.

Issue one: What is a combat ASL? That is, is it the difference between peacetime requirements and an on-hand ASL, or is it the difference between an on-hand ASL and what we need to sustain our forces in combat until the supply trains can be established? I often have heard it argued that we have never deployed with a certainty that we were deploying with the right mix of supplies and equipment. Still, I believe the second proposition above accurately describes what a combat ASL is: it is the difference between an on-hand ASL and what we need to sustain our forces in combat until the supply trains can be established.

Issue two: How do we develop a pre-positioned combat ASL? Actually, a tool that can be used to develop combat ASL requirements has been developed already. This is the deployment stock package (DSP), an automated interactive process created by LIA that computes wartime requirements. While the DSP retains a certain amount of subjective decision making, it is the nearest thing to an automated combat-ASL developer the Army has yet produced. It is not mandatory for use in the ASL computation process, but it certainly is an option for determining wartime requirements. I believe the DSP initiative will enable us to tailor a combat ASL to individual units, both divisional and nondivisional. (Information about the workings of the DSP process can be obtained from the LIA homepage at http://www.lia.army.mil.)

Issue three: How do we pay for a combat ASL? For many years now, we have not had the operation and maintenance, Army (OMA), dollars to buy a full-up peacetime ASL. Given this, how do we pay for a com-

bat ASL with OMA dollars? The answer is, *We can't!* At least we can't without a supplement to our annual budget. However, I suggest a combat ASL for our early deployers can be developed and accounted for in the Army Working Capital Fund (AWCF) until it is bought by OMA dollars with supplemental allowance dollars or until, upon declaration of war or OOTW, it is "free issued."

Issue four: Where do we do store the combat ASL to get it quickly into the hands of the early deploying units? There are several options—

- Option 1 is to identify the combat ASL requirements and pre-position them in the main direct support units (DSU's) or forward support base (FSB) supporting the early deploying units. This option allows the early deployers to depart with a full-up PLL and ASL and maintains the integrity of AWCF assets. These stocks could continue to be accounted for as AWCF stocks and could be issued to fill normal OMA requirements and replenished on a one-for-one basis. However, to do so, a separate Standard Army Retail Supply System-1 (SARSS–1) computer will have to be issued to each main DSU because the SARSS–1 computers cannot be segregated into separate OMA and AWCF accounts. (These additional SARSS–1 computers would be minimal in number.)

Additionally, the accountable officer for the main DSU OMA-funded ASL also will have to be appointed as the accountable officer for AWCF stocks. (This procedure presents no conflict of interest because an accountable officer is already accountable for any asset in his control, regardless of source of supply.) This allows for separate visibility and accountability for OMA and AWCF ASL assets located at the tactical main DSU or FSB. Billing and payment for the assets should present no problem because as OMA stocks are depleted, the unit will submit a requisition that will be filled either by OMA stocks (if on hand) or from the AWCF. Since the AWCF will own the stocks, and OMA dollars must be used to purchase from the AWCF, this is a no-risk solution for the wholesale level and a boon for tactical commanders.

- Option 2 is to identify the combat ASL requirements and store them at the installation directorate of logistics (DOL) for early deployers. This option maintains the integrity of AWCF-owned assets. However, it is questionable whether the combat ASL could be transferred to deploying units within the required deployment time period. Further, if the stocks have to be shipped from the installation DOL to the area of responsibility, additional costs will be incurred.

- Option 3 is to identify the combat ASL requirements and pre-position them at a depot. However, it is unlikely that the combat ASL could be delivered to early deployers in time for uploading onto ASL prime movers before actual movement out of the installation gate. It is more likely that the early deployers would have to marry up with their combat ASL in the area of operations. This option may place our early-deploying units at risk if they have to marry up with their requirements at the port.

- Option 4 is to identify the combat ASL requirements. When the AWCF owns the ASL, the DA Deputy Chief of Staff for Logistics (DCSLOG) would direct prepositioning in the main DSU or FSB supporting the early deploying units. Since the AWCF would own the stocks, and OMA dollars must be used to purchase from the AWCF, this would be a no-risk solution for the wholesale level and the tactical commanders.

None of these options will be easy to accomplish, and my personal preference, option 1, is perhaps the most difficult to implement. Certainly there are multiple obstacles to overcome. Obstacle 1 is the fear that AWCF assets may disappear (revisit my property accountability discussion for option 1). Obstacle 2 is the need to field additional SARSS–1 computers. Obstacle 3 is the creation of some (even if minimal) additional work load because we would have additional assets to manage. Obstacle 4 is the possible need for additional mobility containers. Obstacle 5 is the cost of moving assets from the depot to retail installations.

Sending off our early deployers without a full-up combat ASL could be disastrous, as the next war may not be fought against an enemy who waits for us to bring the fight to them, as happened in Southwest Asia.

Regardless of the obstacles, and given on-going initiatives that will result in decreased retail supply-level ASL on-hand assets as well as depot stocks, I believe that the Army leadership needs to speedily explore developing and establishing a combat ASL. **ALOG**

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TAQ: Leading Change Into the Next Century

by Joe Antunes, Lieutenant Colonel William Danzeisen, and Patricia Ellis

Since the collapse of the Soviet Union and the Warsaw Pact in 1989, the United States has been the preeminent economic, political, and military power in the world. The global security environment continues to change significantly; these changes provide the nation, the Department of Defense, and the Army with both challenges and opportunities. Numerous post closings, force structure and infrastructure reductions, and the transformation of the Army from a threat-based, forward-positioned force to a capabilities-based, strategically positioned, power-projection and mission-adaptive force have had major impacts on the lives and careers of every Army soldier and civilian. In this changing environment, the Army has fostered two key transformation goals: becoming a seamless, interdependent Army that leverages the core competencies of its three components, and becoming the most effective and efficient force possible.

Six Army Imperatives

Quality people
Doctrine
Force mix
Realistic training
Modernization
Leadership development

The Army has been involved in 29 military operations since the end of the Cold War in 1989. This represents a significant increase over the 10 notable Army deployments during the previous 40 years, 1949 to 1989. In peacemaking, peacekeeping, nation-building, and conflict resolution activities, America's soldiers presently are deployed in over 200 missions in more than 75 countries to ensure that minor instabilities do not fester into threats to our national interests. Increased operational deployments under reduced resources require greater emphasis on effectiveness and efficiency.

The Army has embarked upon a bold journey to transform and reshape itself into a force fully prepared for the next century—Army XXI. Army Vision 2010 describes the Army's journey and focuses on both the operational imperatives and the enabling technologies the Army will need to support joint and combined operations as articulated in Joint Vision 2010. To achieve the goals of Joint Vision 2010 and Army Vision 2010, the Army plans to leverage technology, challenge traditional ways of doing business, foster innovation and experimentation, develop concepts with the potential for high return on investment, and, most importantly, empower the soldiers and civilians of the Total Army. As the Army moves into the next millennium, it is focused on six Army imperatives listed in the center of this page.

Total Army Quality (TAQ) is helping the Army not only to adapt to change but also to master and lead change into the next century successfully. Since its adoption as the Army's management philosophy in 1992, TAQ has evolved into the Army's integrated strategic management approach to change. Key aspects of this TAQ philosophy and its implementation are described in AR 5-1, Army Management Philosophy; the Leadership for Total Army Quality Concept Plan; the Vice President's National Performance Review; and the Army Performance Improvement Criteria (APIC), a customer-centered approach to continuous improvement.

Today, the Army is at the forefront of the Federal Government in its implementation of numerous performance improvement initiatives. Army organizations are proud recipients of important performance improvement awards associated with the President's Quality Awards program. The Tank-Automotive Research, Development, and Engineering Center (TARDEC), the Armament Research, Development, and Engineering Center (ARDEC), and, most recently, Fort Benning, Georgia, have received the prestigious President's Quality Award. These organizations have combined Army leadership doctrine with core quality management principles and concepts under TAQ to create an environment for significant and sustained organizational improvement.

Just as the Army's leadership doctrine establishes the principles that provide the tools to execute its operations doctrine, TAQ addresses both the enduring nature of change and the fundamental imperative to accomplish the mission. Through the diagnostic systems methodology of the APIC, TAQ emphasizes an integrative and

comprehensive approach that embodies, aligns, and balances the power of proven management disciplines, including TAQ, value management, business process reengineering and reinvention, acquisition reform, and change management. The APIC, patterned after the Malcolm Baldrige National Quality Award criteria, focus on and improve the overall effectiveness and efficiency of Army organizations in three specific ways. Using the seven categories of APIC (see list below), the Army establishes a standardized approach for assessing where its organizations are on the battlefield of change. The APIC provides a framework that complements the alignment and balance of the six Army Imperatives. The APIC facilitate innovation and performance improvement "on the move," as the Army defines and meets the challenges of the next century.

Transforming the Army into a more businesslike, efficient, and cost-effective organization is nonnegotiable. TAQ is fundamental for all leaders at all levels: officers, noncommissioned officers, civilians, and contractors. High-octane organizations must foster an organizational culture and a strategic management approach that welcome, and even provoke, change. Success requires an assessment framework to manage the complexities of change. The APIC provide a systematic and comprehensive framework that requires commitment to continuous improvement. By using the APIC, an organization seeks ways to improve operations, gain more flexibility, align internal processes with customer satisfaction, and identify opportunities to form partnerships to fulfill the organization's responsibilities as a good steward.

Army Performance Improvement Criteria (APIC)

Leadership
Strategic planning
Customer focus
Information and analysis
Human resource focus
Process management
Business results

Innovative approaches to leadership and management are important in today's challenging, multidimensional environment. Velocity management and acquisition reform are significant applications of TAQ processes and principles to better meet logistics challenges. Senior leaders and managers are encouraged to reject the status quo in favor of innovative, challenging leadership development programs that help military and civilian leaders to develop and practice the most effective leadership skills possible. In this vein, it is essential to take a fresh look at the training and development of senior military and civilian leaders and managers.

Total Army Quality Courses offered by the Army Logistics Management College

Putting Customers First
Whatever It Takes
Assessing Organizational Improvement Using APIC
Quality Overview
Facilitator Training
Seven Habits of Highly Effective People
Four Roles of Leadership
What Matters Most

Since 1992, the Army Logistics Management College (ALMC) at Fort Lee, Virginia, has conducted TAQ training and education programs. The Army Training and Doctrine Command formally designated ALMC as the Army-wide TAQ training provider in 1995. As a result of this designation, ALMC developed common-core TAQ training for officer and warrant officer advanced courses and the first sergeants course. ALMC's TAQ training and education program is described in the box above. ALMC personnel have served as examiners and judges for the Headquarters, Department of the Army-level Presidential Quality and Army Communities of Excellence awards programs since 1994. Under an Army Forces Command contract, the college has expanded its TAQ training to include several Stephen Covey leadership courses and seminars. For more information on TAQ and training opportunities, access ALMC's website (http://www.almc.army.mil and click on Quality Management), or call (804) 765-4762 or DSN 539-4762. ALOG

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SYSTEMS

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MULTICOMPONENT UNITS REQUIRE INTEGRATED SYSTEMS

Operating in a multicomponent environment. Whether engaged against the opposing force (OPFOR) at the National Training Center or building bridges in Bosnia for Operation Joint Forge, today's Army is composed of an active component (AC) and reserve component (RC) mix. The integration of the AC/RC mix into training and worldwide operational missions is a part of the growing trend to employ all Army assets to meet mission needs. Multicomponent forces consisting of active Army, Army National Guard (ARNG), and U.S. Army Reserve (USAR) units have been a part of operational plans for many years, but the current operational environment makes full integration a necessity.

A key initiative being explored toward this end is the establishment of fully documented, permanent multicomponent units (MCU's) instead of ad hoc assembly of AC/RC units for a particular operation or training. The establishment of these MCU's would enhance greatly the training and readiness capabilities of all concerned, but it would present a number of logistics and administrative challenges. These challenges include not only integrating logistics Standard Army Management Information Systems (STAMIS), but also standardizing numerous unique business processes, political or administrative chains of command, adjunct information systems, funding lines, and high-level regulatory directives and guidance. Full integration cannot occur until each component's systems and business processes are invisible to the user and can provide the required functionality and management information up and down the chains of command without exception.

From a historical perspective, MCU systems integration was complex, because each component literally was an army unto itself. Each component established its own administrative, financial management, personnel, supply, and maintenance systems within the context of general Army guidance or by approved exception to policy. These systems, in most respects, did not duplicate the wartime systems used by the active Army. Instead, they performed peacetime functions not included in tactical systems. Separate systems were justifiable because of the technical limitations at the time of inception. The mobilization scenarios of that period generally allowed weeks or months for RC units to transition into the active Army and become ready for deployment and integration as combat assets. In essence, there was no need for rapid integration and speedy deployment. In recent years, this mobilization scheme has not been effective in meeting the needs of post-Cold War operational requirements.

Given this historical context, how does the Army integrate data and information systems into MCU's? This column will attempt to identify the major short-term problems pertaining to integrating current logistics STAMIS into MCU's and provide a framework for their resolution. The long-term solutions for MCU's will have to be addressed by requirements generated for the Global Combat Support System-Army (GCSS-Army).

Property accountability in MCU's. Property accountability is the most basic logistics function. All components use the Standard Property Book System-Redesign (SPBS–R) and the Unit Level Logistics System-S4 (ULLS–S4). MCU functionality was not a requirement in the design, and no data fields exist within the program to designate component ownership for a particular piece of equipment. Complicating the process is the fact that supply policy updates vary to accommodate component-unique business practices and command and logistics support structures. Property accountability for MCU's will be accomplished by merging data and/or

modifying policies to enable MCU property information to reside in a single reportable data base while retaining component visibility. Curiously, Army policy allows for free transfer of equipment from active to reserve components but prohibits the reverse. This policy was developed to protect RC equipment but now hinders the integration and management of RC equipment under active component headquarters. For example, an engineer dump truck company under an active component engineer battalion would need multiple property book officers and multiple SPBS–R or ULLS–S4 computers to capture and manage information separated by component. One solution at the policy-making level might be to dictate uniformity of ownership throughout an MCU command. Once ownership of property is resolved, issues related to differing standards for inventory, reports of survey, and other administrative controls still will need to be resolved to ensure a uniformity of reporting protocols consistent with readiness.

ULLS-Ground and ULLS-Aviation are used to report equipment readiness throughout the Army. AC units report readiness monthly, while the RC reports on a quarterly basis. Standardization of reporting is clearly in the "doable" category, but the task of gathering data from units and maintenance facilities for consolidation at the reporting command level is a major hurdle because of the geographic dispersion of the RC. Another complication is the fact that the ARNG relies on organization maintenance shops and the USAR uses the area maintenance support activity, either of which may or may not use STAMIS. Both activities perform a combination of organizational and direct support maintenance for an assigned area. In order for the company, battalion, and higher headquarters to capture readiness and financial management data across components, it may be necessary to develop "middle-ware" to translate protocols between component proprietary software and Army standard systems.

In all Army units, the supply function provides materiel assets, and the supply management function provides information on equipment on hand and its state of readiness. Different units use different methods of ordering supplies or replacing equipment in each component, although they all rely on the Standard Army Retail Supply System (SARSS). The AC unit normally submits requisitions through its designated supply support activity (SSA). The SSA operates a SARSS computer to capture the demand, locate the item in its warehouse, produce a materiel release order, or pass a requisition to a higher level of supply for replenishment. The SSA replenishes its stock through the Corps/Theater Automated Data Processing Service Center Phase II (CTASC II) system at a materiel management center (MMC) (above division level). Each component uses a variation of this architecture. An ARNG unit may use a local SSA to pass requisitions to the U.S. Property and Fiscal Office (USPFO) CTASC II. A USAR unit may pass its requisitions to a contractor-operated SSA, which passes the requisitions to one of three regionally located CTASC II systems at the MMC level. The issue for MCU supply is that a single headquarters could be dealing with multiple SSA's dispersed across a number of states. The insertion of MCU's into a supply network will require close coordination, not only for managing supplies, but also for managing the financial systems to oversee the transfer of funds between component purses.

Making the MCU concept work. In the long term, creating MCU's will provide the impetus to produce better integrated systems and cause combat developers to examine and challenge established logistics and administrative architectures throughout the Total Army. In the short term, MCU logistics systems integration requires multiple-component leadership committed to resolving and streamlining processes and multifunctional expertise to address requirements within current and emerging systems. The commitment of leadership will allow the creation of work groups to resolve cross-component issues and to provide workable ways to use the current STAMIS and adapt to GCSS-Army. A work group consisting of systems operators, logistics managers, and policy specialists from all components and all functions is necessary to formulate procedures, protocols, and recommendations for policy changes and ultimately for executing the systems integration.

The integration of systems, from accountability and maintenance to retail supply to wholesale supply, must address and resolve the issues of multicomponent functionality. GCSS-Army has challenged existing logistics paradigms and addressed the need to cross over islands of automated or isolated tactical systems to realize the factory-to-foxhole vision. Just as many reserve units must transition quickly to deployment, logistics systems must allow a seamless transition of data from home station to the theater of operations.