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Back Cover:
U.S. Army engineers in Operation Iraqi Freedom

FEATURES

DEPARTMENTS

Clear The Way

By Major General R.L. Van Antwerp
Commandant, U.S. Army Engineer School

In the last issue of *Engineer*, we explored the (then named) Objective Engineer Force and its path to transforming our Regiment. As you know by now, we are no longer using the term Objective Force; instead our focus is the Future Force as we continue the Transformation mission.

This issue of the bulletin is focused on aspects of the major combat operations phase of Operation Iraqi Freedom.You will be provided some insights into what happened during the preparation for, and execution of, this complex, tremendously challenging and superbly executed engineer support to Operation Iraqi Freedom. I expect that discussions of the following articles in this bulletin will take place at your professional development (officer and NCO) and command information classes: "Victory Sappers: V Corps Engineers in Operation Iraqi Freedom" by Colonel Martin; "The Inland Petroleum Distribution System" by Captain DeSimone; "Engineer Operations in Turkey Support Operation Iraqi Freedom" by Lieutenant Colonel Nosal; "Army Diver Missions in Iraq" by First Lieutenants West and Inskeep; "Engineer Operations in Urban Environments" by Lieutenant Colonel Funkhouser; "Helping Iraqis Rebuild Iraq" by Colonel Vossler; and "Prime-Power Considerations" by Captain Van Epps. There is much more that we will publish in future issues of this bulletin as we write the next chapters of Army engineer history.

Even though Iraq and Afghanistan remain combat zones, we must begin the analysis and begin to answer "What happened?" From 3 to 5 November 2003, the senior leaders of the Regiment will gather in Savannah, Georgia, to continue the after-action review (AAR) process at the regimental level by coming to grips with the question "Why did it happen?" and begin the discussion on "What do we need to do about it?" We will seek to identify the truly critical aspects of how the lessons learned from Operation Iraqi Freedom apply to engineers in the Current and Future Forces, as well as develop thoughts on how to implement those lessons learned into our Army Transformation efforts.

Seek out lessons learned articles and AARs from engineer units and senior engineer leaders as they are published. They are powerful and valuable learning tools. In some way, virtually all of our Regiment has been affected by the events of the past two years, and I solicit your comments and ideas to help us in the transformation of our Regiment.

It is with immense pride that I serve as the Commandant of the U.S. Army Engineer School. These past months have seen the truth in the phrase: "One Corps–One Regiment–One Team." It has been especially gratifying to see the outstanding readiness displayed on mobilization and arrival at Fort Leonard Wood of our U.S. Army Reserve and Army National Guard engineers. Those citizen soldiers have answered the call and have done what they were asked to do. With nearly 75 percent of our engineer soldiers in the Reserve Component, there is just no way all the engineer missions would have been accomplished by relying only on the active forces.

It is also important at this time to acknowledge the tremendous support our soldiers have received from their family members. Separation, and especially separation involving a family member in combat, is an extra stress component that requires love and special handling. Family Readiness Groups have remained key elements to keeping the home fires burning and an information and support group that lend stability to a traumatic situation. Thanks to all of you.

As the Army's builders, we construct our future from the groundwork of our past experiences. Our true heritage and the history we hold dear was merged from the cement of our values and the blood of our heroes into the enduring concrete that is our Regiment. Our Regiment is people, and when we suffer the losses that we did recently, we must take their inspired service and ensure that those who follow as Army engineers know of their exploits and deeds while facing enemy fire in direct combat operations. We dedicate all that we do to their memory. Essayons!

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Private First Class Jason Meyer	Bravo Company, 11th Engineer Battalion, Fort Stewart, Georgia
Staff Sergeant Hollinsaid Lincoln	Bravo Company, 11th Engineer Battalion, Fort Stewart, Georgia
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Staff Sergeant Mark A. Lawton	Alpha Company, 244th Engineer Battalion, Grand Junction, Colorado

Lead The Way

By Command Sergeant Major William D. McDaniel, Jr.
U.S. Army Engineer School

As I begin this article, it is very difficult for me to express in words my thoughts about the role of the U.S. Army Engineer School Regimental Command Sergeant Major (CSM). This position is not only very important to the Commandant and Assistant Commandant of the School but also to all the soldiers and leaders in the Engineer Regiment. I must state my sincere appreciation to Major General (MG) Van Antwerp and Brigadier General (BG) (P) Castro for allowing me the freedom to accomplish my job and the opportunity to get out and visit engineers throughout the continental United States (CONUS) and outside CONUS (OCONUS).

As many of you know, I was selected by MG Van Antwerp, Commanding General of the Maneuver Support Center (MANSCEN) and Fort Leonard Wood, to serve as his post CSM, and on 19 May 2003, I received my charge during the change-of-responsibility ceremony. In addition to fulfilling the duties of my new position, I will continue to support and cover down on the duties of the Regimental CSM until my replacement, CSM Clinton Pearson, is in place here at Fort Leonard Wood.

Although I only served as the Regimental CSM for eight months, the time between the start and finish date is not important. What is important is what we accomplished together between those dates and the impact we had during that time.

MG Van Antwerp often uses a *bus* to describe key leaders/people in this great organization. He states that it is important to have the right person, on the right bus, in the right seat, at the right time to be an effective organization. I have been extremely humbled, blessed, and honored to serve in this capacity and represent all of you. I believe that I have made a positive impact in our Regiment and that I was on the right bus, in the right seat, at the right time in our history as a Regiment.

In fact, I have been on a great bus with a great team of teams. I have been extremely fortunate to have this opportunity to serve with two general officers who are superb leaders—both very talented and experienced and visionaries in their own right. They demonstrate caring and concerned leadership through their selfless examples daily, and they have taught us all a sense of balance in our lives and profession, which is absolutely essential and necessary in this great profession. They have been great role models for all to follow—with their personal examples of balance—and neither of them just gives this lip service but rather physically demonstrates it every day. As a senior NCO, I have learned so very much from both of them in my personal and professional life, and I am honored to have served with both of them.

I feel that I have managed to bridge the gap in communicating with our CSMs and Sergeants Major from all components (including retirees) within our Regiment. I tried very hard to provide information and to stay connected with them so I could help with their issues. During my time as Regimental CSM, I visited a number of locations throughout our engineer communities. I enjoyed the opportunity to talk to our soldiers and leaders, report their issues and concerns to the Commandant and Assistant Commandant, and then see the Engineer School "Team of Teams" go to work to resolve these issues reported from you in the field. I feel that I have represented all engineer soldiers (Active Component, National Guard, and Reserve—past and present).

These are exciting and trying times for us as engineers. Buzzwords such as *transformation, maneuver support transformation, Future Force engineering, geospatial engineering, transforming the Regiment T3 (transform the Regiment, train soldiers and leaders, take care of [support] the Regiment), force pooling, engineer effects module (EEM), engineer mission team (EMT), engineer mission force (EMF), assured mobility, countermine, counter-booby trap, mine dog team, urban breachers, Officer Education System, NCOES transformation, MOS conversions, MOS consolidations*—and many others—come to mind. A lot is happening in our environment as we look to the future.

I am a soldier with lots of energy and one who always wants to make a positive difference. I don't know all the answers. What I do know is that I love being a soldier, and because of this passion, I will continue to embrace every challenging position with absolute commitment and selfless service. So as I move to the MANSCEN post CSM position and complete this last article to you, I must say thank you for your total support and confidence.

My thoughts and prayers go out to all the soldiers on point around the globe and to all their families during their separation. Remember to always think safety as we accomplish our required missions, regardless of where we find ourselves. Take care of your soldiers, yourselves, and your families. God bless you all, my very best goes out to you, and please stay in touch!

Essayons!!

Victory Sappers:
V Corps Engineers in Operation Iraqi Freedom
Part 1: The Attack to Baghdad and Beyond . . .

By Colonel Gregg F. Martin and Captain David E. Johnson

"The sappers of the Victory Corps were all over the battlespace, providing value wherever they were employed . . . river crossing operations, building and maintaining infrastructure, conducting stability and support operations, repairing airfields, conducting combat operations—and much, much more . . . all done to an exceptionally high standard . . . each member of this high-energy team is a national hero."

—Lieutenant General William S. Wallace
Former Commanding General, V (U.S.) Corps

A year after the fateful 11 September 2001 attacks, the United States began to assemble a "coalition of the willing" for the second phase of the war on terrorism—the liberation of Iraq. The United States and coalition allies built up forces in neighboring Kuwait and prepared for war. After diplomacy failed, the air and ground forces of the assembled coalition crossed the Iraqi border on 21 March, with V (U.S.) Corps leading the attack as the main effort. The attack, code-named Operation Iraqi Freedom, isolated Saddam Hussein's bases of power in Baghdad and Tikrit. The goal was to eliminate the regime quickly—with a minimum loss of life and destruction of civil infrastructure—in order to rapidly transition to Iraqi civil rule capable of ensuring peace, prosperity, and freedom for the Iraqi people.

U.S. Army engineers played a crucial role during the initial attack and continue to do so during the follow-on stability and support operations and rebuilding effort. Every element of the

An armored D9 dozer clears a road blocked by a destroyed vehicle.

Engineer Regiment has contributed to the fight: Active and Reserve Components and civilians; combat engineers of every type (armored, mechanized, airborne, wheeled, air assault), combat heavy, construction, bridging, and topographic, as well as divers (see article on page 28), fire fighters, well drillers, and utilities/prime-power personnel (see articles on pages 52 and 55), facility engineer detachments and teams, and the U.S. Army Corps of Engineers (USACE). During initial combat operations, engineers assured the mobility of the ground forces, enabling coalition forces to move rapidly north and overwhelm Iraqi military forces. As the high-intensity fighting ebbed, engineers transitioned to stability and support operations, as well as humanitarian civic action (HCA), performing virtually every conceivable type of mission.

Although theater Army, Marine Corps, Navy, Air Force, and coalition engineers all played a vital role in the campaign, this article focuses on the V Corps engineer effort, and in particular, the role of echelon-above-division (EAD) forces. The article first looks at the planning that set the conditions for such a remarkable triumph. It then describes the decisive role that the V Corps engineers played, reviews some of the lessons learned from the campaign, and recommends ways for engineers to improve their performance on future battlefields. The authors concentrate mostly on the planning and high-intensity combat phases of the campaign, as the stability and support operations are still ongoing and the lessons to be learned are still emerging.

Engineer Plan and Task Organization

Engineer planners at V Corps and the various divisions did a magnificent job under very challenging conditions. These challenges came from the compartmentalization of information; the dispersion of key planners and units across multiple posts, countries, continents, and time zones; and the competing requirements of numerous simultaneous real-world missions.

The engineer plan was based on the emerging doctrine of "assured mobility." To support this doctrine, it was crucial for commanders to understand the impact of terrain and weather on military operations. In the V Corps headquarters, the Terrain Analysis Platoon of the 320th Engineer Company (Corps) (Topographic), 130th Engineer Brigade, provided map and imagery analysis that yielded the V Corps commander and his staff products to visualize and understand the terrain. Moreover, each division had embedded terrain analysis teams that could provide similar analysis tools. Further, combat engineers throughout V Corps validated their charge as terrain experts, providing key analysis and timely decision-making products to the maneuver commanders.

Throughout V Corps and the divisions, the true testament of engineers was enabling commanders and staffs to "see" and visualize the terrain to a degree never before witnessed in warfare. The V Corps commander, deputy commander, chief of staff, and key members of the battle staff spent countless hours studying and analyzing special terrain products with the V Corps senior terrain technician and his terrain analysts at their sides—helping key leaders comprehend the impact of the terrain in order to make the right decisions. The 320th Engineer Company and, in particular, the Terrain Platoon embedded in the V Corps battle staff, proved their incredible worth time and again throughout this campaign. Every effort should be made to retain this powerful capability at the corps level to ensure that battlefield commanders continue to have the right tools to make the very best decisions.

For each phase of the operation, planners from the V Corps Staff Engineer Section (SES) estimated the engineer effort required to support the scheme of maneuver. Working with the 130th Engineer Brigade, the SES resourced subordinate units with EAD engineers to accomplish required tasks. The planners identified several missions that were critical to the Corps, such as breaching border obstacles; maintaining main supply routes (MSRs); clearing and opening Tallil Air Base for medical evacuation (MEDEVAC) and C-130 resupply operations; developing logistics support areas (LSAs) and convoy support centers; using bridging assets for multiple river crossings; constructing C-130 and unmanned aerial vehicle (UAV) airstrips and hundreds of helipads; clearing and opening Baghdad International Airport; and providing for the tactical mobility and survivability of the maneuver forces.

Key engineer units were sent to Kuwait relatively early in the deployment process because planners and senior leaders recognized the importance of getting engineers into the theater early.

The engineer plan maximized the support forward to the divisions and accepted risk in the corps rear area. The early-arriving EAD engineer units went to support the 3d Infantry Division (3ID), V Corps's main effort. The 130th Engineer Brigade initially detached its organic 94th Engineer Battalion (Combat)(Heavy) and 54th Engineer Battalion (Combat), along with several multirole bridge companies and the 937th Engineer Group, to reinforce the 3ID division engineer (DIVENG) brigade and its organic units—the 10th, 11th, and 317th Engineer Battalions (Combat). The 94th was organized into force packages and tenaciously reduced obstacles, upgraded MSRs, constructed LSAs, built helipads and airfields, and prepared banks for river-crossing operations. The 54th provided critical combat engineer support to the divisional cavalry squadron, augmented the divisional engineers to weight the main effort, and provided command and control (C2) for both the border crossing and an assault float river crossing. Shortly before the attack, the 130th controlled just a single combat heavy company until follow-on EAD engineer units from Forts Lewis, Carson, and Drum arrived and were able to cross the line of departure. This decision was made to ensure that 3ID was properly weighted with EAD units and set for success.

Follow-on divisions also received EAD engineers. Each division ultimately received an engineer group headquarters to assist with the C2 of EAD engineers within the division's area of operations. This arrangement allowed the divisions' organic engineers to focus forward on providing mobility support to the maneuver elements in the offense. Because the environment was so austere, the requirements for engineers outweighed their capabilities. Given the scarce engineer resources, the priority was to resource the main effort first, then resource the other divisions as additional units arrived. This kept only a modest engineer capability in the corps rear area until well into the stability and support operations phase of the campaign.

Engineer Missions

Throughout the campaign, V Corps engineers performed virtually every conceivable type of mission. In addition, they simultaneously deployed forces; conducted reception, staging, and onward integration (RSOI); attacked into Iraq; and conducted both stability and support operations and HCA missions—bringing together and fighting an engineer force from all components and every type of engineer unit, geographically dispersed over hundreds of miles in combat and over multiple time zones and continents during deployment.

During the attack to Baghdad, the 3ID DIVENG brigade was weighted with the 937th Engineer Group, the 94th Engineer Battalion (-), the 535th Engineer Company (Combat Support Equipment [CSE]), the 54th Engineer Battalion, and several multirole bridge companies. The 130th commanded and controlled the 864th Engineer Battalion (Combat)(Heavy) (plus two additional line companies) and the 642d Engineer Company CSE; the 565th Engineer Battalion, which included the 502d Engineer Company (Assault Float Bridge [AFB]), the 38th Engineer Company (Medium Girder Bridge [MGB]) and the 544th Engineer Team (Dive); and the 320th Engineer Company (Topographic). In addition to supporting 3ID, the 130th also provided EAD engineer support to the 101st Airborne Division and its organic 326th Engineer Battalion, the 82d Airborne Division and its organic 307th Engineer Battalion (-), 3d Corps Support Command, numerous V Corps separate brigades, the V Corps command posts, and Special Forces elements—all this while maintaining MSRs and alternate supply routes (ASRs) stretching 500 kilometers from the Kuwait-Iraq border to Baghdad.

V Corps would ultimately grow to a force of four-plus divisions and an armored cavalry regiment (ACR). However, the attack to Baghdad, destruction of the Iraqi Army, and forced collapse of the regime was conducted principally by 3ID, 101st Airborne Division, 82d Airborne Division (-), and the V Corps separate brigades, supported by the remarkably modest engineer force described in the preceding paragraph. After the fall of Baghdad, the V Corps engineer force grew to more than 19,000 soldiers in 3 brigades, 5 groups, 30-plus battalions, and numerous separate companies and detachments—an enormous force required and organized for subsequent combat, HCA, stability, support, and force bed-down operations that continue throughout Iraq. Some of the major missions include the following:

Improve Bed-Down Facilities

One of the first tasks facing engineer units upon arrival in Kuwait was improvement of the austere bed-down facilities. While most of the base camp construction was handled by theater engineers, V Corps engineers improved facilities by building protective berms, command posts, and ammunition holding areas; constructing helipads and nuclear, biological, and chemical decontamination sites; maintaining and upgrading roads; and providing numerous quality-of-life improvements such as gravel pads, electrical work, carpentry jobs, and drainage. In assembly areas in the open desert, engineers also found innovative ways to build gravity showers and burn-out latrines from the limited materials at hand. Currently, engineer units are focused on constructing force bed-down facilities throughout Iraq.

Breach Border Obstacles

The first critical mission of the war was breaching the border obstacles. Before the attack, American and Kuwaiti engineers moved forward and cleared multiple lanes through the 5-kilometer-deep obstacle belt that marked the Kuwait-Iraq border. The 937th Engineer Group commander was the initial crossing force engineer—with the 54th Engineer Battalion commander serving as the crossing area engineer, responsible for the C2 of division forces as they passed through the breach lanes. Along each lane, combat engineers and military police manned traffic control points, with construction equipment and recovery vehicles nearby to remove blockages. The entire operation had been planned and rehearsed in detail before the attack; all key leaders in the division and corps drove through a full-scale mock-up of the border and the lane-marking system prior to execution. During the actual breach, once 3ID combat units had passed through the border, control of the crossing transitioned from division to corps, with the 130th Engineer Brigade's 864th Engineer Battalion commander assuming the role of crossing force engineer. This handover allowed the 3ID engineers to move rapidly north and focus on the forward fight.

Clear and Repair Runways

The next major corps engineer mission was at Tallil Air Base, southwest of An Nasariyah. Capturing the airfield would allow the coalition to fly attack aviation, MEDEVAC flights, and C-130s closer to the front. A mechanized task force from 3ID, supported by A Company, 317th Engineer Battalion, captured the airfield; however, the runway and the surrounding facilities were unusable because of landmines, unexploded ordnance (UXO), craters, and protective berms. A team of engineers from the 54th, equipped with the M1 Panther II—a modified Abrams tank specially designed to clear minefields—cleared 200,000 square meters of the runway, allowing the first Apache attack helicopters to land. Then B Company, 94th Engineer Battalion, brought dozers, graders, and scrapers to finish repairing the runway for use by Air Force planes and to dig protective positions for the Patriot air defense batteries capable of defending the airfield against attack from Iraqi missiles. In less than 12 hours, the airfield was C-130 capable. Within two days, it was structurally capable of receiving all aircraft types, including C-5s.

Engineer soldiers repair the airfield at LSA Anaconda, near Balad, Iraq.

Maintain and Improve Supply Routes

Maintaining and upgrading the hundreds of kilometers of MSRs and ASRs, ultimately stretching from the Kuwait border to Baghdad, was an enormous and critical mission. As V Corps attacked through As Samawah and on to An Najaf, fierce enemy resistance caused the Corps to divert traffic off the preferred paved highways and onto the inferior secondary desert route to the west, a move that allowed enhanced convoy security.

The huge volume of heavy-duty military traffic quickly deteriorated the already substandard Iraqi pipeline road, which had become the V Corps MSR. Much of the road had to be upgraded and widened to accommodate the thousands of heavy trucks hauling fuel, ammunition, water, and supplies to the forward units—only to return to Kuwait to retrieve more supplies and drive north again. Large stretches of the road disintegrated into "moon dust," requiring the two combat heavy battalions and CSE companies to perform herculean efforts in maintaining and upgrading these routes under extremely adverse weather and combat conditions.

Build LSAs

The two combat heavy battalions and CSE companies also built five enormous corps and division LSAs that leap-frogged from southern Iraq, north to Baghdad, and beyond to Balad, which was conquered by 4th Infantry Division (4ID) in mid-April. While the divisions were still in direct contact with nearby enemy forces, engineers built these critical logistical support bases that included construction and maintenance of UAV runways, C-130 and larger airfields, hundreds of helipads, cargo distribution centers, convoy support centers, fuel bag farms, water distribution points, field hospitals, enemy prisoner of war holding areas, and hundreds of kilometers of force protection berms, as well as improvement of nearby MSRs. After the fall of Baghdad, engineers began to focus on force bed-down and quality-of-life improvements in the LSAs and forward operating bases.

Provide Survivability/General Engineering Support

While divisional engineers fought the close fight, EAD engineers provided critical survivability and general engineering support for divisional, corps, and Special Operations Forces all over the battlefield, to include the battles for As Samawah, An Najaf, Karbala, and Baghdad. With such a relatively small engineer force operating over several hundred kilometers of battlespace, the key to success was in splitting battalions, companies, and platoons into small, mobile teams based around functional capability. While the battalion headquarters managed large projects like constructing an LSA, these smaller modules were given orders to move rapidly to the needed locations and aggressively execute high-priority missions. The impact was enormous as these modules maneuvered independently around the battlefield, rapidly providing critical engineer support. The standard package consisted of a dozer team, a bucket loader, a small emplacement excavator (SEE), a dump truck, and a vertical squad. This module could move rapidly and make an immediate and significant impact in handling a wide variety of survivability and general engineering missions. Based on the mission, enemy, terrain, troops, and time available (METT-T), this package was easily augmented with other equipment to handle larger missions. The flexibility, power, and speed of these modules ensured that units received responsive engineer support throughout the V Corps area of operations.

Construct and Repair Bridges

The ability to cross rivers was key to V Corps's operational maneuver. The Iraqi army rigged nearly all of the major bridges across the Euphrates River for demolition and succeeded in damaging several. Fortunately for V Corps, most of the key bridges were captured at least partially intact. Engineers emplaced numerous MGBs across damaged spans and conducted one AFB crossing under fire, just south of Baghdad. This heroic assault across the Euphrates River, the last natural barrier between the coalition forces and Baghdad, set the conditions for the final attack on Baghdad. Shortly after the fall of Baghdad, in Saddam Hussein's hometown of Tikrit, the 565th Engineer Battalion assumed control of a combined arms task force of more than 1,000 soldiers and emplaced a 536-meter AFB over the Tigris River in support of the 4ID. This became one of the longest float bridges ever built in a combat zone. It was completed on 28 April, Saddam's birthday, and was therefore nicknamed the "Birthday Bridge." The damaged fixed bridge was later reopened with two Mabey-Johnson logistic support bridges, also constructed by the 565th. During subsequent stability and support operations, engineers have emplaced numerous Mabey-Johnson bridges and MGBs throughout Iraq. In addition, a heavy dry support bridge was emplaced for the first time in combat, in support of the 101st Airborne Division in northern Iraq.

Conduct Urban Operations

Engineers played a key role in the urban battles of As Samawah, An Najaf, Karbala, and Baghdad. Combat engineers provided excellent mobility support, fighting alongside tanks and infantry. During military operations on urbanized terrain (MOUT), engineers knocked down walls with M9 armored combat earthmovers (ACEs) and explosives; cleared roads blocked by mines, destroyed vehicles, or rubble with armored D9 or mine-clearing armor-protected (MCAP) D7 dozers; built hasty road blocks for force protection and traffic control; and destroyed caches of weapons and ammunition. Although many missions were not standard engineer tasks, engineers from many units exhibited technical and tactical proficiency and an excellent ability to improvise. Of particular note, the armored D9 dozers were tremendously effective in MOUT, as they were the lead combat vehicles into several urban battles.

Repair Infrastructure

As the southern cities of As Samawah, An Najaf, and Karbala were liberated, engineer assessment teams began working with local civic leaders in assessing and beginning the repair of Iraqi infrastructure—often only a few blocks from where the fighting continued. Forward Engineer Support Teams (FESTs) from USACE were key to this effort, as was a strategy to hire local Iraqis to provide construction materials, equipment, and services as rapidly as possible to repair and build Iraqi civil infrastructure, as well as military infrastructure and bases. This strategy had two purposes: to put Iraqis back

The "Birthday Bridge," over the Tigris River, is one of the longest float bridges ever built in a combat zone.

> *"The one BOS that has been consistently critical at every phase of the campaign—from the border obstacle breach, all the way through the attack, to current stability and support operations—and has performed uperbly and come through big time for the Corps at every turn . . . has been the engineers . . . .The engineers have been the most flexible, versatile, multipurpose, and important force—from start to finish—in the campaign . . ."*
>
> *—Major General Walt Wojdakowski*
> *Deputy Commanding General, V (U.S.) Corps*

to work as quickly as possible in rebuilding their own country, which would generate employment, stimulate the economy, and generate pride in themselves and their communities; and to mitigate the theaterwide shortage of both engineer troops and construction materials. Initiated by the 130th Engineer Brigade early in the campaign at LSA Bushmaster in southern Iraq, this effort grew steadily, reaching new heights with 3ID in Baghdad, and it continues to be a main effort of coalition forces throughout Iraq.

Provide Community Assistance

During the transition from combat operations to stability and support operations, engineers played a key role in civic action operations. The most prominent example has been "Task Force Neighborhood," an initiative of then V Corps commander, Lieutenant General William Wallace, whereby coalition forces help Iraqis clean up and rebuild their country—one neighborhood at a time. The basic concept is to put engineers in command of a combined arms task force consisting of construction equipment and soldiers and medical, dental, military police, civil affairs, psychological operations, public affairs, combat camera, and explosive ordnance disposal (EOD) personnel.

The original Task Force Neighborhood was in Baghdad in support of 3ID. The V Corps commander gave the mission to the 130th Engineer Brigade, which put the 94th Engineer Battalion in charge. The V Corps commander directed the task force to go into the poorest neighborhoods of Baghdad first to help the people who were most neglected and disadvantaged during Saddam's reign. The effect was dramatic and significant, as engineers provided much-needed assistance for the community's immediate needs, made assessments of their long-term requirements, and reassured them of America's positive intentions. Engineers hired and employed hundreds of local Iraqis to help do cleanup and repairs. Together they hauled away thousands of tons of accumulated trash, cleaned up and repaired numerous schools and hospitals, disposed of thousands of UXO, repaired playgrounds and sports facilities, and worked to restore basic services. Such efforts have been instrumental in improving relations with the local communities, getting Iraqis to rebuild Iraq, and paving the way for the eventual return of Iraqi civil government. This concept has become the cornerstone of current stability and support operations efforts, with each of the divisions developing its own version of Task Force Neighborhood, to include the innovative Task Force Graffiti and Task Force Pothole developed by the 101st Airborne Division in Mosul. Perhaps an Iraqi journalist in Baghdad best summed up the value of Task Force Neighborhood when he said, "No one has ever cared about this neighborhood or these people before, until you, the Americans, came. Thank you." (For more information, see articles on pages 42 and 62.)

Perform Nonstandard Missions

Throughout the campaign, engineers performed a wide variety of nonstandard missions that were critical to the success of V Corps. These missions included conducting boat-mounted riverine patrols; hauling, storing and destroying captured enemy ammunition and equipment; burying dead enemy soldiers; collecting, hauling, and disposing of enormous quantities of trash and garbage; and performing numerous civil-military support operations to help the Iraqi people. In taking on and accomplishing these important nondoctrinal missions, the engineers of V Corps enhanced the historic reputation of Army engineers as being the most flexible, multifunctional, can-do, make-it-happen soldiers on the battlefield.

What Went Well

Assured Mobility Concept

Operation Iraqi Freedom validated the emerging doctrine of assured mobility. In a dynamic operational environment, engineers should focus on ensuring the uninterrupted mobility of the maneuver forces as an outcome, rather than a specific task or battle drill. During the operation, engineers succeeded by using terrain analysis to anticipate potential problems, providing technical advice to maneuver commanders, developing flexible organizations able to anticipate and react quickly under rapidly changing circumstances, and training to the highest level of individual and collective competence.

Aggressive, Rapid Execution

The key to aggressive, rapid execution was moving small modules rapidly to the decisive point on the battlefield where they could make an immediate impact. A solid but partial solution on the battlefield NOW is far better than a more complete and thorough solution that is too late. We were all amazed at the engineer effects that these small modules could deliver at the decisive time and place in the corps-level fight.

Training Philosophy

Much of our success was due to a home station training philosophy that concentrated on "doing less better." Training on the core battle tasks at individual, crew, squad, and platoon levels helped develop soldiers, junior leaders, and units that are flexible, adaptive, and competent—capable of adjusting to new situations and finding innovative solutions to problems.

Terrain Analysis

The engineer terrain analysis and visualization capability returned great dividends, allowing maneuver commanders at all levels to understand the effects of weather and terrain on military operations and enabling engineers to anticipate and adequately resource potential requirements. At the corps and division levels, dedicated topographic units provided support for planning staffs. At the battalion level, many engineer units had developed tactics, techniques, and procedures (TTP) for providing responsive terrain analysis support directly to their supported maneuver commander. Our success in this arena—both at corps and division levels—demonstrated the value of the 320th Engineer Company (Topographic) and validates the requirement for a topographic company and its terrain platoon at corps level.

Engineer Headquarters

Engineer headquarters played an important role as C2 nodes in the campaign. EAD groups and battalions were able to command and control forces at critical nodes, freeing up the engineer brigade and the divisional battalions to focus forward on the close fight. Engineer headquarters are particularly well suited for this task because these critical nodes are often located at potential mobility bottlenecks. For example, engineers controlled the Iraq-Kuwait border crossing, the Karbala Gap crossing, and multiple crossings over the Tigris and Euphrates Rivers. At the Birthday Bridge in Tikrit, the 565th Engineer Battalion controlled a 1,000-soldier task force of engineer, infantry, air defense, and signal units and coordinated additional support from a combat heavy battalion, a corps wheeled battalion, and numerous bridge companies. Although current wisdom from the business schools advises organizations to flatten and reduce the numbers and layers of headquarters, this runs counter to our experience in this campaign, where several levels of engineer headquarters multiplied benefits rather than inhibited success.

Combat Heavy Battalions and CSE Companies

The combat heavy battalions and CSE companies were critical throughout the entire campaign. They were the tip of the spear for the border obstacle crossing and in providing tactical mobility across rough desert terrain—often out in front of attacking armored forces. These units maintained MSRs and constructed LSAs and convoy support centers along the hundreds of kilometers of roads between the Kuwaiti border and Baghdad. Without this effort, V Corps would not have been able to push follow-on units or supplies forward along the substandard Iraqi road network. They constructed or repaired five airstrips, hundreds of helipads, hundreds of kilometers of force protection berms, and much more. They built the access and egress ramps and performed the bank preparation that enabled river-crossing operations. The superb effort of our combat heavy battalions and CSE companies guaranteed the operational mobility, and enhanced the tactical survivability, of coalition forces. Every effort must be made to increase the number of these enormously capable units in the Active Component force structure. The notion that these types of units can or should be replaced by contractors is sheer foolishness. And this campaign proved it.

Embedded Key Enablers

Infrastructure repair and construction were enhanced when key enablers and competencies were embedded inside of executing units. Critical elements were a construction management section with solid technical engineering expertise, a civil affairs team, Arab linguists, and dedicated contracting support.

Reach-Back Capabilities

One of the new capabilities that engineers brought to this campaign was the ability to reach back to military and civilian engineers and harness their experience and expertise. This began with the FEST–Augmentation (FEST–A), which provided technical assistance and the ability to access USACE resources around the world. FEST–As have been critical throughout the campaign on both military and civil engineering. Another critical asset was the TeleEngineering Tool Kit, which enabled engineer reconnaissance teams to send pictures and measurements back to the Engineer Research and Development Center or the Waterways Experimentation Station for technical assessments, bridge classifications, and engineering solutions. These kits were widely used all over the battlefield, from damaged runways, bridges, and electrical power stations to MSRs, helipads, and demolitions work. In addition, they provided a powerful communication capability that allowed engineers to conduct daily videoteleconferences for communication, coordination, and situational understanding. Finally, cooperation and on-site technical advice (which started at the Campo Pond bridge training site in Hanau) between military and civilian engineers paid off with the emplacement of Mabey-Johnson bridges in combat.

D9 Dozer and M1 Panther II

These two items were big winners in combat and should be programmed and fielded into the Army inventory. They must however, come with organic transportation, communications, crew-served weapons, and dedicated operators.

Engineer/Sapper Spirit

Engineers were everywhere on the battlefield, and their hallmark was an amazing can-do spirit. The V Corps commander frequently praised his Victory Sappers for their enthusiasm and "any mission-anywhere-any time" attitude. Their initiative, flexibility, adaptability, dedication, and professional expertise were incredible. Their team spirit in supporting the commander was second to none. Their raw courage and bravery on the battlefield were an inspiration to all.

What Needs Improvement

An Aging Fleet of Equipment

Despite their superb performance, engineer units have some of the oldest equipment in the Army. For combat engineers in particular, much of the equipment was unable to adequately support the maneuver units.

Armored Vehicle-Launched Bridge (AVLB). Based on the M48/M60 chassis, the AVLB is both slow and difficult to maintain under the best of circumstances; continuous operations and an extremely austere logistics environment made the task even harder. The maintenance problems were exacerbated by recovery problems. The AVLB should be replaced by the Wolverine. Much of the construction equipment in combat heavy units and CSEs is in the same condition and must be replaced.

M113 Engineer Squad Vehicle (ESV). The ESV often lagged behind the maneuver forces it was supposed to support. In addition, it did not offer enough protection against enemy fire. Despite their need for mobility support, some maneuver commanders became unwilling to commit their scarce engineer assets forward into the fight for fear of losing them to enemy fire. The Army must outfit armored engineers in an appropriate vehicle that can keep up with the maneuver forces it supports and that offers adequate force protection.

Mine-Clearing Line Charge (MICLIC) and the Volcano. These two key engineer weapon systems—both mission-essential in the combat training center environment—did not meet expectations. During Operation Iraqi Freedom, the Volcano was never fired, and only one MICLIC was fired. For scatterable mines, the release authority was held at the Combined Forces Land Component Commander level; during a rapidly moving campaign against an ill-defined enemy, it is nearly impossible to identify a target and get timely approval to use scatterable mines during a short window of opportunity. For breaching, a more effective technique was either to physically remove the mines or to conduct a mechanical breach with a D9 or an MCAP D7 dozer; an M1 Panther II; a tank with a plow; or an M9 ACE. Given the real-world limitations of both the MICLIC and the Volcano, we should invest in other means to accomplish the intended effects.

Signal, C2 Package, and Logistics Support

For EAD engineers, three special shortfalls emerged: First, although EAD engineers operate throughout the division and corps battlespace, they often were not high enough on the priority to receive dedicated support from corps signal assets and often operated away from divisional signal support. Without the ability to communicate, EAD engineers lost some of their ability to operate independently, provide the mobility portion of the common operational picture, or to serve as key C2 nodes for the division. Second, EAD engineers did not have the same C2 hardware and software that the division was using. This diminished their ability to see and understand the battlefield to the same degree as their maneuver brethren. Third, the logistics systems were not flexible enough to support the dynamic and fast-moving role that EAD engineers played within the division and corps areas of operation. In particular, maintenance (especially Class IX) and construction materials (Class IV) were a constant challenge. These issues need to be worked hard before the next conflict.

Rapid Helipad Construction and Dust Control

There was an enormous demand on engineers to rapidly construct hundreds of helipads in the desert. The dust, dirt, and sand caused dangerous brownout conditions that damaged the aircraft and caused several crashes. The best and fastest method to meet the demand for helipads was to install Mobi-Mat pads. Fast to emplace and extremely effective, this material should be purchased in sufficient quantities and issued to both divisional and EAD engineer units—PRIOR to crossing the line of departure.

Recommendations

Continue to develop assured mobility into doctrine. Develop corresponding mission-essential task list changes, training models, evaluation tools, and TTP for implementing the doctrinal framework. Organizations need to include enhancers such as topographic, engineer reconnaissance, and reach-back capabilities. For example, each division and separate maneuver brigade or ACR needs a FEST–A. TeleEngineering Tool Kits must be fielded to every engineer battalion and ACR engineer company. Another critical component of assured mobility is the ability of engineers to conduct MOUT effectively. (See article on page 32.)

Combat engineers supporting maneuver forces need comparable training and modern equipment to be combat capable and relevant for the maneuver commander. In particular, engineers need a more survivable and capable squad vehicle, preferably one that uses the same chassis as the infantry and armor it supports. Sappers also need equivalent enhancers, such as thermal sights and night-vision capability. MOUT training should receive greater emphasis and Engineer Qualification Tables should include mounted gunnery so that engineers are better trained to fight alongside tanks and infantry. Engineers should be included in fielding distribution plans with the maneuver units they habitually support—and not as separate fieldings.

During combat operations, EAD engineers will be task-organized in functional teams to perform specific missions. To prepare for combat, units should develop, train, and employ force enhancement modules (FEMs) designed around capabilities rather than units. (See "Transforming the 130th Engineer Brigade…One Step at a Time," *Engineer*, May 2001, pages 52-60; and "Operation Enigma Strike: Testing the Deployability of the 130th Engineer Brigade FEMs," *Engineer*, April 2002, pages 41-43.) Deployments and decentralized training are the preferred mediums for training the junior leaders who will form these modules and operate independently across wide areas of operation. Such leaders must be flexible, adaptive, and innovative—able to make things happen based on a clearly articulated and understood commander's intent.

Engineers must work more closely with the Ordnance Branch on EOD. The requirement for the destruction of weapons caches, ammunition dumps, and UXO quickly outstripped the resources of the EOD units, and combat engineers picked up the excess. With greater mutual cooperation and training, combat engineers and EOD specialists could work together to relieve much of the workload for routine demolitions and free up dedicated EOD teams for unusual situations or emergencies.

Two months after the capture of Baghdad International Airport, there were virtually no international construction contractors operating in Iraq, and military construction units continue to perform nearly all heavy construction. That contractors could or would do what the military engineers have done during combat and the early stages of stability and support operations is an ill-conceived fantasy, with no basis in reality. And this operation has clearly demonstrated that fact. EAD engineers are critical enablers for divisions during sustained operations. The Army needs to retain as many combat heavy battalions and CSE companies on active duty as possible. The general engineering effort they provide is an engineer core competency that cannot be contracted to civilian engineers during combat operations. The Engineer Regiment must champion this cause, as most of the Army never sees these units in action. General engineering requirements are usually ignored in peacetime training and computer-based Warfighter exercises—or they are performed by civilian companies like Brown & Root—and therefore the force regularly underestimates their value.

All EAD engineer units must be structured to operate independently and form multiple functional modules for particular missions (for example, a C2 headquarters for a river crossing, an MSR team, and an airfield team), to include personnel and equipment for C2. Consider developing multifunctional battalions with an extremely robust C2 infrastructure. As an example, the 565th Engineer Battalion (Provisional) performed great service during the crossings of both the Tigris and Euphrates Rivers. This battalion should be formally recognized, activated, and manned.

C2 systems such as the Force XXI Battlefield Command - Brigade and Below (FBCB2) and Maneuver Control System (MCS) need to be standardized and pushed to lower levels, particularly for EAD engineers. Engineers also need greater long-range communications capability; terrain information is particularly bandwidth-intensive and overwhelms tactical communications nets. Engineers also need greater transportation capability in order to remain mobile.

Non-modified table of organization and equipment (MTOE) enablers, such as the M1 Panther II and the D9 dozers, were great and must be added to the MTOE along with the supporting prime mover, communications capability, and a mounted .50-caliber machine gun.

Conclusion

"Operation Iraqi Freedom was and is an engineer's war. During the fight, and even more now, the engineers are critical. We cannot do without the engineers."

—Major General Walt Wojdakowski
Deputy Commanding General, V (U.S.) Corps

The Engineer Regiment provided outstanding support to V Corps during Operation Iraqi Freedom. Although the engineers accomplished all of their missions and enabled V Corps to accomplish its historic mission to liberate Iraq, there are many lessons to learn from the high-intensity phase of the war, and there will be many more as we fight to win the peace. Learning these lessons and continuing to develop highly motivated, professional soldiers, units, and leaders—with the right doctrine, equipment, and TTP—will ensure that the Engineer Regiment is ready again the next time the nation calls.

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Captain Johnson is with the 54th Engineer Battalion, deployed to Iraq in support of Operation Iraqi Freedom. He has served in Korea and on the V Corps staff. He is a graduate of the United States Military Academy and holds a master's from Oxford University.

On behalf of all the Victory Sappers, we express our deepest thanks, respect, and admiration to Lieutenant General William S. Wallace, the former V Corps Commanding General. His clear intent and power-down leadership ensured that his sappers always knew what to do and took the initiative to get the job done—ALL OVER the battlefields of Iraq. VICTORY!

In addition, the authors would like to acknowledge the visionary leadership and work of previous 130th Engineer Brigade commanders. Many of their initiatives came to fruition on the battlefields of Iraq, where Army engineers have never been better. SAPPERS IN!

For more information and a video on the V Corps engineers during Operation Iraqi Freedom, see the 130th Engineer Brigade Web site "130th OIF Interactive History" at NIPRNET <*http://www.130th engineers.army.mil*> or SIPRNET <*148.35.87.68*>.

The Inland Petroleum Distribution System in Kuwait and Iraq

By Captain Anthony De Simone and Major Norm Gauthier

On 14 January 2003, the 62d Engineer Battalion (Combat)(Heavy) from Fort Hood, Texas, deployed to the Kuwaiti U.S. Army Central Command (CENTCOM) area of operations in support of Operation Enduring Freedom. The 62d was the first combat engineer battalion in country and was assigned as a direct-reporting unit to the 416th Engineer Command, the theater-level engineer command from Chicago, Illinois. The unit's job would be to construct the Inland Petroleum Distribution System (IPDS) in preparation for an attack on Iraq—a mission usually reserved for one or more engineer pipeline companies, which are all reserve units. The IPDS would be constructed from Camp Virginia, Kuwait, to Logistics Support Area (LSA) Adder (near Tallil Air Base), Iraq, a distance of about 224 miles. The pipeline was essential, as one of the Combined Forces Land Component Command's (CFLCC's) prestart conditions for the war with Iraq was the completion of the IPDS to Breach Point West on the Kuwait-Iraq border.

Upon receiving the mission, we contacted the 808th Engineer Company (Pipeline) in Houston, Texas, to learn about the construction of an IPDS. They sent us the training manuals and CDs, but we were unable to go to Houston for training due to the short deployment suspense. Eventually, the battalion received the 226th Engineer Company (Combat) (Heavy) and the 808th Engineer Company (Pipeline) in February and March, respectively. The battalion strength averaged 750 soldiers during the time period when the IPDS was constructed.

A soldier from the 62d Engineer Battalion couples a section of the pipeline while an oil fire burns in the background.

IPDS

The IPDS is a rapid deployment, general support, bulk fuel storage and pipeline system manufactured by Radian, Inc. The system has a design throughput of 720,000 gallons per day based on 600 gallons per minute at 20 hours per operational day. The IPDS is transported in military vans (MILVANs) and packaged in sets containing materials to construct a pipeline 5 miles long. Each set fills 13 MILVANs. There are 1,404 sections of pipe, 19 feet long and 6 inches in diameter, that fill nine of the MILVANS. The other four MILVANs contain necessary pipeline parts such as couplings, elbows, hammers, retaining pins, and gate and check valves.

The 19-foot-long sections of pipe are made of aluminum with variable wall thickness. These sections cannot be cut. Instead, each 5-mile set contains 44 pieces of 9-foot-6-inch-long pipe with constant wall thickness that can be cut to length and regrooved. Each piece of pipe is designed with a special single-groove design in order to join pipe sections. When two pieces of pipe are joined, snap-joint coupling clamps hold them together. Each clamp has an integral gasket that makes pipe connections relatively easy. Before installing the coupling, a light coat of petroleum lubrication is applied to prevent the gasket from adhering to the metal pipe in extremely hot temperatures. The coupling holds the pipe sections together by wrapping around the grooves on the ends of the two sections of pipe. The coupling is closed with a special tool (included with the set) and is held shut by hammering a retaining pin into place.

There are a few guidelines to follow when constructing the IPDS. The aluminum pipe used in the IPDS is highly reactive to changes in temperature. Expansion and contraction of the

Soldiers from the 808th Engineer Company construct a pump station in Kuwait.

pipeline can move it almost 2 feet per 50 sections of pipe. Each coupling is designed to handle 4 degrees of deflection, so it is important to control the amount of expansion and contraction. Some ways to control the expansion and contraction are to—

- Install the pipeline as straight and level as possible.
- Make any change of direction by using elbows.
- Construct anchors and "U" or "Z" expansion loops at certain intervals.

Another thing to consider when constructing the IPDS is maximizing fuel flow. To do this, we needed to install pump stations, which consist of two 800-gallon-per-minute mainline pumps, a launcher to launch a pig (a scraper that passes through the line to clean it), and a receiver to catch the pig. The pump is best moved by a rough terrain cargo handler or crane. The launcher and strainer weigh about 2,800 pounds each.

IPDS I runs from Camp Virginia through Camp Udairi to Breach Point West.

Once the IPDS is constructed, it has to be filled and flushed before placing it in operation. The pipeline is designed to run at 600 gallons per minute with each pipe section having a maximum allowable operating pressure of 740 pounds per square inch. Water is pumped into the pipeline and a pressure check is conducted. Once the pipeline passes the pressure check, a pig or scraper is passed through the pipe via the launcher and caught by the receiver. The pig scrapes the sides of the pipe, removing any sand or debris before fuel is added. Behind the pig, fuel is pumped into the pipeline. Once the pig is received at the pump station, that section of pipe is charged with fuel and ready to operate. If there are any problems along the way, a repair crew closes the gate valves and repairs that section of pipe. After these tests are conducted, the pipeline is operational.

To deliver fuel from the pipeline, tactical petroleum terminals (TPTs)—run by quartermaster units—are set up at desired intervals. The mission of the TPTs is to receive, store, and dispense fuel, and millions of gallons of fuel can be stored or delivered to tankers or other vehicles.

How We Did It

Since the war was still months away, we could not construct all 224 miles of pipe simultaneously. As a result, we broke the mission into five segments, IPDS I through IPDS V.

IPDS I

IPDS I stretched from Camp Virginia to Breach Point West (about 51.5 miles) near the Iraq border in preparation for a ground assault. Because we had so many miles of pipeline to construct, six pump stations and two large TPTs to build,

Alpha Company, 62d Engineer Battalion, transports pipe by loading three MILVANs on a lowboy.

and the TPT at Camp Virginia to expand, we broke the pipeline trace into company sections. They then broke their sections into platoon sections. Each company was given a section of the trace and daily goals to meet. At the start of the pipeline, we only had three line companies. We used a planning factor of 2 miles per day per company or about 6 miles per day for the battalion. We trained our leaders on the IPDS on 24 January. Our trainer had been in the 515th Engineer Company (Pipeline) during Operations Desert Shield and Desert Storm, when the company laid more than 100 miles of pipeline. Due to the short duration of the war, that pipeline was never used to pump fuel.

Since our ship had not come into port yet, we borrowed transportation assets (5-ton cargo trucks and high-mobility, multipurpose wheeled vehicles [HMMWVs]) and sent two vertical platoons, one each from Alpha and Bravo Companies. We reserved the other two vertical platoons for port download operations. Construction of the IPDS from Camp Virginia to Camp Udairi began on 28 January 2003.

The ship with our equipment arrived in port on 31 January, and we began download operations the following day. With commercial and heavy equipment transport, we moved the battalion from Camp Arifjan to Camp Udairi on 7 February. We set up our base camp operations, and the next day all six vertical platoons were working on their assigned sections of pipeline. Our plan was to stage two 5-mile sets every 10 miles, but external transportation assets were in demand and routed elsewhere. As a result, we used our M916/M920 and M870 trailers to move pipeline and our 25-ton all-terrain cranes to load the MILVANs.

Pipeline construction continued at a rapid pace as Bravo Company moved its command post to a location just outside of Breach Point West and started construction from there back toward Camp Virginia. The 10-mile segment was primarily on flat ground but incorporated three large crossing sites for maneuver forces. Each 5-mile set of pipeline comes with 80 feet of 24-inch nestable culvert. We were tasked to build ten 100-meter (approximately 328 feet) crossing sites over the 51.5-mile trace, and there were several sites where the pipeline crossed the main supply route (MSR). Since these crossing site requirements exceeded the supplies in the pipeline set, we contracted for the delivery of hundreds of pieces of 19-foot-long PVC culvert with a 13-inch diameter. We modified the pipe layout to ensure that we had gate valves and expansion loops before each large crossing site. By digging with the hydraulic excavator (HYEX), the crossing sites were emplaced easily and didn't hamper progress.

One section of IPDS I that we called the "moonscape" required special attention. It was a 5-mile-long section that passed through rough terrain and sand dunes. The equipment platoon from Headquarters Support Company spent 9 days with seven dozers leveling this area before pipe could be laid there. In all, it took 21 days to complete IPDS I, 5 days ahead of schedule. However, it took the quartermaster personnel an additional 21 days to fill and test the line. Normally, the pipeline construction company would have performed this task, but it had not yet arrived in country. One of the lessons learned for our construction of IPDS II was to incorporate time into the work schedule to fill and test the line.

IPDS II

As the possibility of war increased, the CFLCC projected a larger daily requirement for fuel at Breach Point West. As a result, we needed to construct an additional pipeline parallel to IPDS I. There was one consideration in constructing this section. Pipe and pump stations were only estimated for one pipeline to reach approximately 205 miles. By constructing this second pipeline, issues would arise later on that might prohibit the pipeline from reaching LSA Adder. Equipped with many lessons learned from IPDS I and the addition of the 808th Engineer Company, the battalion was able to complete IPDS II with ease. Alpha and Bravo Companies and the 226th Engineer Company concentrated on pipeline construction, and the 808th focused on pump station construction and filling and testing the line. Headquarters Support Company cleared another trace through the moonscape with Bravo Company.

Challenges

Transportation. External transportation assets were always in high demand. We were forced to transport MILVANS to worksites a few at a time with internal haul assets (M916/ M920 and M870 trailers, as well as the Palletized Load System [PLS] with flatracks). Using internal assets, we averaged 6 to 8 miles of pipeline constructed per day. With dedicated PLS support, we constructed 34 miles of pipeline in a 2-day period.

Water. Getting the water required to flush and fill the pipeline was difficult, and we experienced several delays waiting for water. In the end, most of our water requirements had to be contracted out and brought in by commercial assets.

MOPP1. After the completion of IPDS I and II, the ground war started, and all units went into MOPP1. Progress on IPDS III into Iraq slowed because now the soldiers were in MOPP1 and wearing flak vests in temperatures near 120 degrees. Drinking water was essential, as were timed breaks for soldiers. Pipeline sections now took two to three times as long to construct as those constructed before the war.

Rough Terrain and Sandstorms. Most terrain in the desert was flat and ready for pipeline construction. The section in Kuwait that we called the moonscape was difficult to work through. Many days were spent and thousands of tons of sand were moved to prepare the site. At times, sandstorms reduced visibility to less than 20 yards and prevented the pipe seals from staying free of debris. The rough terrain and sandstorms also made it impossible to align the pipeline for anchoring.

Crossing Site Adjustments. A pipeline set includes 80 feet of nestable culvert. We had to build crossing sites 100 meters across for tracked-vehicle maneuverability. Luckily, we were able to obtain 19-foot lengths of 13-inch diameter culvert from Camp Doha and link the pieces together to span the required length.

Extended Lines of Communication. We worked on sections of the pipeline that spanned more than 60 miles at a time. Communications became an issue when our FM radios did not transmit the entire distance. To overcome this problem, we set up retransmission sites in Kuwait. In sections in Iraq, we set up base camps every 15 to 20 miles to maintain communication between base camps.

Tricks of the Trade

Quality Assurance/Quality Control Inspections. Building pipeline can be monotonous, and it was important that the S3 section constantly inspect the construction. Often, we identified and corrected mistakes before they caused major problems. We also checked the line with members of the quartermaster unit that took over the pipeline. If the unit identified any problems, we corrected them before turning the pipeline over to the unit. Another valuable asset was the representative from Radian, Inc., who was in theater throughout our construction of the pipeline. He was truly the expert on constructing the pipeline and pump stations.

The battalion's Bobcats were invaluable in constructing the pipeline.

Internal Transportation and Flatracks. We planned for and requested external transportation but also planned for completing the mission without it. We also requested flatracks for our PLS trucks. This asset enabled us to conduct our own transportation of pipeline MILVANs and pump stations. We did not have the volume of vehicles we would have liked, but we managed to keep our trucks with pipeline MILVANS one day ahead of the soldiers constructing the pipeline.

Lessons Learned

Pipeline Construction. Break the unit into several sections by platoon and give them goals.

Construction Meetings. With our limited assets, a detailed construction meeting was a must. Each commander reported progress and identified equipment needs (from Headquarters Support Company or other) for the following 24 to 48 hours. These were addressed to minimize confusion and lost time and to maximize construction effort the following day.

Security. As you lay and couple pipe, the site moves forward, so security must also be mobile. We used two soldiers at each end of the mobile construction site with the M249 squad automatic weapon (SAW) on top of a vehicle to provide clear lines of sight. We increased this in Iraq by using the M2 .50-caliber machine gun, MK-19 grenade launcher, and AT-4 antitank weapon.

Transportation. You need a dedicated transportation unit with 14 or more PLS vehicles. These will greatly reduce the amount of internal haul assets and increase the productivity of the soldiers constructing the pipeline.

Protecting the Pipeline. The only thing we found effective at protecting the pipeline in the desert conditions was berms. We initially constructed 3-foot berms but found that HMMWVs could still go over the top. As a result, we built dual 6-foot berms.

Bobcats®. The battalion received four Bobcats with all attachments before the pipeline construction began. They were a great asset in pump station construction. We used them for installing both gate and check valves, which are too heavy to lift without several soldiers.

Another consideration when constructing the pipeline was how to protect it. At the time, there were many maneuver units in the area preparing for a ground assault into Iraq. Our initial plan to protect and mark the pipeline was to use 8-foot-tall pickets, flying 3 feet of white engineer tape, every 100 meters. CFLCC then issued a fragmentary order to inform all commands of the location of the pipeline and instruct them not to cross over it. With fuel at 700-plus pounds per square inch, it could be dangerous if the pipe ruptured. While this method may have marked the pipeline, it did not protect it. We then constructed a 3-foot-high berm on one side of the pipeline, which also failed to protect it. Finally, we constructed a 6-foot berm on both sides of the pipeline, and this method proved to be effective. For four weeks, all the dozers in the battalion worked at constructing more than 130 miles of 6-foot berm for IPDS I and II from Camp Virginia to Breach Point West (to include force protection berms for the pump stations and TPTs).

This time, IPDS II (the same 51.5 miles as IPDS I) only took the battalion 12 days to construct and 5 days to fill and test. We finished on 18 March and fulfilled the CFLCC requirement for fuel prior to the ground war. With IPDS I and II complete, there were 103 miles of pipe on the ground, enough to sustain V Corps and I Marine Expeditionary Force (MEF) ground and rotary-wing combat forces.

IPDS III

IPDS III began a few hours after the ground war started. The team, consisting of a HYEX and two squads from the 808th, was attached to the 6th Engineer Support Battalion, Marines out of Oregon. They crossed the border and began digging crossing sites so the battalion could follow with pipe without delay. On 22 March, the remainder of the battalion crossed the border and secured their base camps in Iraq. To maintain FM radio communication, each company established its base camp within radio communication distance. As a result, the battalion had uninhibited communication throughout the area of operation for the new pipeline. This section of the pipeline stretched from Breach Point West in Kuwait to LSA Viper in Iraq, a distance of 58 miles.

Since we were now in a combat zone, soldiers had to take additional safety precautions. For the first three weeks of pipeline construction in Iraq, soldiers worked in their Joint Service Lightweight Integrated Suit Technology (JSLIST) suits (at mission-oriented protective posture [MOPP] level 1), flak vests, and full combat load of ammunition. With all of this gear, production dropped to less than a mile of pipe constructed per day per company, a 50 percent decline in productivity. This reduction was acceptable, as completion dates had been adjusted accordingly.

IPDS III, consisting of 58 miles of pipeline and four pump stations, was finished on 14 April, ahead of schedule. Before the ground war, the initial goal for IPDS III was to extend to Tallil Air Base near LSA Adder. However, a few days into the war the area was still not secure from enemy activity. Consequently, the plan changed from reaching LSA Adder to reaching LSA Viper instead.



A crossing site at MSR Iron Horse Trail

Engineers lay pipe for the IPDS.

IPDS IV

By the time the pipeline reached LSA Viper, LSA Cedar I was secured and was ready for fuel delivery. IPDS IV would extend an additional 29.5 miles from LSA Viper to LSA Cedar I. Construction on two additional pump stations began on 15 April. Each company was given about 10 miles to complete, and progress went smoothly. We were now a seasoned pipeline construction unit, anticipating problems before they occurred. Alpha and Bravo Companies and the 226th continued to construct the pipeline while the 808th focused on pump station construction and filling and testing the pipeline.

An important thing to consider when filling and testing the pipeline is the availability of water. This requirement was always an issue throughout this process. We were in the desert, and water was scarce. To complete the filling and testing, we had to contract local tanker companies to haul water to fulfill our requirements. IPDS IV was completed on 20 April without a hitch, merely 5 days after it was started.

IPDS V

Just when we thought we were done with pipeline construction, we received orders to continue the pipeline to LSA Cedar II, north of LSA Adder. This section would extend the pipeline an additional 34 miles and require three pump stations. However, since we constructed IPDS I and II in Kuwait, we had used more pipe than we scheduled for, and there were no pump stations in country to continue IPDS V.

Simultaneous to our pipeline construction, the Kuwaitis had completed a contract for a fuel pipeline from Camp Virginia to Camp Udairi, so IPDS II was no longer needed. We decided to send platoons from Bravo Company to recover this pipe to construct IPDS V. A platoon from the 226th leveled the berms, and the 808th removed the pump stations. In order for the pipe to be recovered, it had to be flushed with water, uncoupled, and air-dried before handling.

Platoons from Alpha Company and the 226th constructed IPDS V as fast as pipe could get to them and finished it on 13 May. Then the battalion withdrew from Iraq—one company at a time—into base camps in Kuwait and waited for further missions.

Conclusion

When the pipeline construction was finished, the 62d Engineer Battalion had completed the longest operational IPDS ever constructed by the Army. More than 720,000 gallons of fuel could be pumped daily from Kuwait into LSA Cedar II in Iraq, a distance of 224 miles. The soldiers of the battalion moved more than 66,000 pieces of pipe, weighing 4,500 tons. The battalion learned many lessons from conducting this mission. Although a pipeline can be constructed without a pipeline company, we found that with the assistance of the 808th Engineer Company, the battalion's efficiency greatly increased. The 808th also was able to reduce the fill-and-test process by several weeks, which enabled the battalion to meet every deadline early. The 62d Engineer Battalion's success can be attributed not only to having a good plan but also to having superior noncommissioned officers and motivated soldiers. Ensuring that they knew the importance of this mission was directly correlated to the success of the CFLCC mission.

Captain De Simone is the construction officer for the 62d Engineer Battalion, Fort Hood, Texas. He was previously a platoon leader and executive officer in the 52d Engineer Battalion (Combat)(Heavy) at Fort Carson, Colorado.

Major Gauthier is the S3/operations officer for the 62d Engineer Battalion. He previously served as the S3/operations officer for the 91st Engineer Battalion, 1st Cavalry Division, at Fort Hood.

Engineer Operations in Turkey Support Operation Iraqi Freedom

By Lieutenant Colonel Roxanne Nosal, Lieutenant Colonel Randal Fofi, Lieutenant Colonel John McClellan, and Major Shawn McGinley

In the fall of 2002, U.S. Army Europe (USAREUR) was directed to open a northern front into Iraq in support of potential actions against the Hussein regime. The area of operations would include an 800-kilometer line of communications in Turkey with up to 18 different nodes—all requiring acquisition of property, careful environmental consideration, and construction or modification to ready them for up to 60,000 soldiers. A hodge-podge of roughly 3,300 Army and Navy engineers had been identified to perform the mission; however, no headquarters structure was available to oversee the planning or execution. As a result, the reactivation of the 18th Engineer Brigade (theater Army), which was scheduled for June 2003, was moved to 21 January 2003. (See article in *Engineer*, April-June 2003, page 37.)

The reactivation of the 18th Engineer Brigade served two major purposes: First, the core of the brigade headquarters serving as theater engineer planners is fully engaged in the development of operations plans and therefore has the

A Seabee from Naval Mobile Construction Battalion 4 surveys for the logistics support area near Nusaybin, Turkey.

Logistic support areas were constructed primarily through the LOGCAP contract. Shown are bunk beds at Oguzeli.

advantage of anticipating and planning for engineer requirements in a contingency. Secondly, although the U.S. Army Corps of Engineers (USACE) has enormous capabilities that can be brought to bear as required during contingencies, these assets do not typically come with an overarching headquarters capable of integrating small, specialized units (both Active and Reserve Component) where they can best influence the operation. The 18th Engineer Brigade is fully capable and designed to perform this mission. This became evident in Turkey in February 2003.

Operational Concept

The USAREUR mission in Turkey was to establish and operate the infrastructure required to pass combat forces centered around the 4th Infantry Division through southeastern Turkey into Iraq. This mission was considered vital to achieve the U.S. Central Command (CENTCOM) commander's intent of opening a credible northern front against Iraqi forces and fixing up to 13 Iraqi divisions in northern Iraq so they could not shift south to engage coalition forces attacking out of Kuwait.

Army Forces–Turkey (ARFOR–T) was organized around four major units:

- 1st Infantry Division provided overall command and control and force protection for all U.S. ground forces in Turkey.
- 21st Theater Support Command operated the logistics infrastructure and sustained all U.S. forces in Turkey and northern Iraq.
- 7th Signal Brigade established and maintained the communications architecture for ARFOR–T.
- 18th Engineer Brigade acquired the property and built or improved the facilities to support the forces.

The original plan allowed up to 60 days for preparatory work before the arrival of combat forces. This included establishing command and control and force protection, acquiring property, opening three seaports and two airports, and establishing operational nodes along 800 kilometers of highway and into Iraq in the east. Node sizes and complexities varied from basic truck stops for driver breaks along the highway to tactical assembly areas up to 50 square kilometers in size. It was envisioned that, once established, the 4th Infantry Division would flow in over a 28-day period and prepare to attack into Iraq.

With the approach of combat operations and no decision by the Turkish government to allow combat forces to pass through the country, the USAREUR commander decided to accelerate the preparation schedule and to focus efforts on those tasks required to support the combat forces initially. Instead of a 60-day preparatory phase, the USAREUR staff developed an abbreviated plan to rapidly acquire and prepare ports and staging areas for use by the 4th Infantry Division. This plan would take about nine days but would allow the rapid introduction of forces into the CENTCOM operation.

Scheme of Maneuver and Task Organization

To support the general operational concept, the USAREUR staff identified the preparatory tasks that had to be completed to receive and pass the 4th Infantry Division. The 18th Engineer Brigade, serving as the USAREUR engineer prior to deploying to Turkey, determined that the essential tasks included acquisition of properties for ports, airfields, headquarters, and staging areas and the establishment of minimum living and sanitation facilities to support the reception and rapid onward movement of combat forces.

The engineer scheme of maneuver was built around these essential preparatory tasks to meet the CENTCOM timeline and assure the success of the overall operation. The compressed timelines drove engineer planners to adopt a course of action that would initiate all essential tasks simultaneously through contract construction—a combination of Kellogg, Brown & Root Services; the Logistics Civil Augmentation Program (LOGCAP) contractor; and USACE contractors. Military construction units would be focused at the area of greatest need upon their arrival. As essential tasks were completed, engineer effort would be shifted to secondary tasks—mainly those tasks required to sustain ARFOR–T units. If there were sufficient engineer resources in theater, then all tasks would be initiated simultaneously as long as the execution of a secondary task did not interfere with essential tasks. The concept also called for the 18th Engineer Brigade to be prepared to follow and support into northern Iraq as the theater matured and the Coalition Forces Land Component Command (CFLCC) force passed through. Likely missions in northern Iraq would be maintaining supply routes, constructing and repairing bridges, and constructing camps for displaced persons and enemy prisoners of war.

The task organization was built around this concept**.** The brigade headquarters would be augmented with members of the divisional engineer brigade of the 1st Infantry Division, Forward Engineer Support Teams (FESTs) from USACE, and real estate specialists from the Europe-based Installation Management Agency. The brigade integrated itself into the ARFOR–T with the commander wearing two hats—18th Engineer Brigade commander and ARFOR engineer. The FESTs provided subject matter experts in various fields of engineering as well as contracting officer representatives to help manage contract construction. In addition to construction capability, the brigade's task organization also included base camp maintenance and management capability in the form of facilities engineer teams and prime-power, fire-fighting, and utilities detachments.

Priorities and Execution

Having identified the essential tasks, the brigade planners prioritized them in coordination with 1st Infantry Division, 21st Theater Support Command, and USAREUR planners. The basic rule of thumb was that priority tasks were those tasks absolutely necessary to receive the 4th Infantry Division at the port, lodge them in austere conditions in a tactical assembly area in the east, and allow them to attack with appropriate stocks of fuel and ammunition.

Once in country, the brigade planners devised a master plan for each node. This process called in site survey chiefs, site officers in charge, force protection specialists, the LOGCAP contractor, and members of the security force to define in detail where everything would go and in what sequence. The tasks to be accomplished at each node were further prioritized so there would be no confusion by the contractor. These prioritized statements of work were provided to the contractor through the contracting officer. The 18th Engineer Brigade served a vital role in the development and approval of all statements of work to ensure that the contractor was focused on only essential tasks. New requirements were submitted to a construction review board to review their validity and to a joint acquisition review board for final approval. At this time, projects identified as having a highly technical and discrete nature were passed to the local USACE office at Incirlik Air Base for action. These projects—the Seyhvelet Bridge bypass and the lightning protection system and Agalar Pier—were issued as individual contracts to specialized Turkish contractors.

Change of Mission: Increase Support to ARFOR–T

In March, it became obvious that the Turkish government would not make a decision quickly to allow forces into the country. At that time, the ARFOR–T preparatory forces the government of Turkey had allowed in (about 1,800 soldiers) were dispersed throughout Turkey, living under fairly austere conditions and waiting for the go-ahead to continue the mission. With these new circumstances, the ARFOR–T commander shifted the priorities to ensuring an adequate quality of life and providing protection for ARFOR–T soldiers.

In general, this meant shower and sink units and tents/sleeping areas with heat and lights and whatever force protection infrastructure improvements that were deemed necessary. This was a distinct change from the austere approach that had been planned. However, the 18th Engineer Brigade planners were able to quickly modify contract statements of work, and the LOGCAP contractor, with sufficient personnel and materials on the ground, was able to rapidly modify its priorities. The advantage of using the LOGCAP contractor was that it is able to react to changes across a broad front versus having to have individual contracts modified.

A 6,700-foot heavy equipment transport bypass for Seyhvelet Bridge

Change of Mission: Closure

As the end of March approached and the government of Turkey had not called for a revote on the introduction of combat forces through Turkey, CENTCOM directed the 4th Infantry Division to proceed to port in Kuwait. No replacement force for the 4th Infantry Division was identified. Since the government of Turkey was also requesting the departure of Operation Northern Watch units, it appeared unlikely that any other support to Operation Iraqi Freedom would be approved. As a result, USAREUR directed ARFOR–T to develop a detailed plan and be prepared to downsize the current ARFOR–T capability and place those facilities into a "warm" status required to either pass a small ground force through Turkey (should it be approved) or to maintain a ground line of communication through Turkey to sustain forces in northern Iraq. On 2 April 2003, ARFOR–T directed the reshaping of forces in Turkey and began closure operations.

The key closure tasks focused on an orderly and deliberate reduction in forces and equipment while simultaneously returning properties to the appropriate Turkish owners and harvesting as much U.S. material as practical, while ensuring the protection and safety of all personnel. The 18th Engineer Brigade was charged with forming east and west closure teams to return leased lands and facilities to the private owners or government entities of origin. Each of the closure teams was tailored to its particular geographic and facilities makeup and contained expertise in operations, construction management, real estate, environmental engineering, logistics, contracting, and legal matters.

Much attention was paid to the question of what materials were to be recovered, disposed of, or offered to local owners or military forces. Broad guidance from the USAREUR commander to "recover all U.S. government property and return it to the military system" was translated into specific harvesting guidance addressing various commodities. Customs restrictions were researched to ensure that the unit and node commanders were aware of what materials could and should be loaded into unit containers for return to Europe.

Closures in the east were completed by 16 April and in the west by 26 April, culminating with the return of the port of Iskenderun, the last facility required to redeploy the force. In almost every case, the closure teams completed their missions ahead of original projections for the site. The closure checklists, savvy real estate officers, and some smart decisions by the closure teams streamlined the process and ensured that no additional U.S. funds were spent on property rentals beyond already existing commitments.

Conclusion

The 18th Engineer Brigade was the single agency at the theater level with coordinating responsibilities for all military and civilian engineer capabilities and host nation engineer support, as well as joint and multinational engineer efforts engaged in combat support of a theater of operation. This included the command direction of topographic operations, construction, real property maintenance activities, lines-of-communication sustainment, engineer logistics management, petroleum storage and distribution, and base development. During the deployment to Turkey, the 18th Engineer Brigade managed $13.8 million of real estate acquisitions and utilities, $28.1 million of LOGCAP construction, $992,000 of USACE contract construction, and $108,000 of materials for military construction. No single construction delivery method could have met the timeline originally proposed. Only a combination of military engineers, LOGCAP construction, and USACE contractors could have completed the mission on the originally proposed timeline. Having a theater Army engineer brigade managing all of the engineer effort for the Army in the theater allowed the most efficient and cost effective construction delivery method for each situation and made it possible to modify the plan as external forces caused the situation to change.

The theater Army engineer brigade is a unique organization, capable of providing engineer support across the spectrum of military operations depending on which elements are attached to it during the operation. The ability of the organization to be responsive, agile, and versatile is in keeping with the objectives of Army Transformation and will ensure the best possible support to the Future Force.

Lieutenant Colonel Nosal is the G5/NATO infrastructure officer for the 18th Engineer Brigade and the Deputy Chief of Staff, Engineers, U.S. Army Europe. During the deployment to Turkey, she acted as chief of the administrative/logistics operations center. Recent assignments included Deputy Secretary of the General Staff, V Corps, and executive officer, 130th Engineer Brigade.

Lieutenant Colonel Fofi is the deputy brigade commander, 130th Engineer Brigade, V Corps, in Iraq. He was the G3 of the 18th Engineer Brigade for the deployment to Turkey. Previous assignments include commander of the 46th Engineer Battalion (Combat)(Heavy), Fort Polk, Louisiana; liaison officer to the French Engineer School in Angers, France; and brigade S3, 45th Area Support Group, and battalion executive officer of the 84th Engineer Battalion (Combat)(Heavy), both in Hawaii.

Lieutenant Colonel McClellan is the G3, 18th Engineer Brigade (Theater Army). During the operation, he served as the brigade's operations officer, working directly out of the ARFOR–T Main in Mardin. Previous assignments include contingency operations officer (SFOR/KFOR) for Deputy Chief of Staff, Engineers, USAREUR; as well as S3, 9th Engineer Battalion, and director of public works in Schweinfurt, Germany.

Major McGinley is the chief of operations, Staff Engineer Section, V Corps, in Iraq. He was the chief of plans, G3, 18th Engineer Brigade, for the deployment to Turkey. Other assignments include brigade S3, 1st Infantry Division Engineer Brigade, executive officer of the 9th Engineer Battalion, and assistant division engineer, 1st Infantry Division. He will take command of the 54th Engineer Battalion in summer 2004.

Letters To The Editor

A Letter From Iraq

To the MANSCEN Directorate of Training Development,

I really appreciate the box of treats that the people at DOTD sent to me. It meant a lot, knowing there were people who cared enough to do that. The time I spent at DOTD and the MANSCEN was rewarding, and I met a lot of good, dedicated people. I'm proud and thankful that I have been given the opportunity to deploy and do my job as a firefighter. It is a learning experience, and I hope to bring lessons back to use to implement change to our doctrine. My parents taught me that the best lessons learned are those that are learned through hardship. If that is true, this deployment should produce some good lessons learned.

Life here in Kuwait and Iraq is hot, sandy, and windy. It is sad to see the way these people have been forced to live. I know we did the right thing by freeing them. After driving by and seeing what these people have had to endure, it makes me angry when one of our own people complains. We have no reason to ever complain, and I'm proud to be here helping. Keep up the hard work that you do there at DOTD; it pays off on the battlefield, as I have now seen firsthand.

My fire-fighting unit, the 562d Engineer Detachment (Fire Truck) from Fort Leonard Wood, was on the Iraqi border next to the Paladins and Patriot systems the night the war began. At least three Scuds flew overhead as we ran to our bunkers. Also, a mortar round hit and destroyed a Kuwaiti police station about 1 to 2 kilometers from us. We wore various levels of MOPP gear for 2 months.

We are staying very busy and rarely have access to photos or mail. There are no modern facilities here. It's like living back before running water and electricity. But it's great to experience what it's like not having all the things we take for granted; it shows us a simpler way of life.

Those who really know me know that I could talk on forever, but I will cut it off now. Thanks again for the box of treats; I did share it with my soldiers. They are great guys, just as everyone is there at DOTD. Sorry for the sloppy handwriting; I don't have a table to steady the writing pad.

Sincerely,
SFC William A. Brassfield
June 2003

QA/QC Construction Supervision . . . or "Just Wing It"

As a nonengineer, I read *Engineer* for general interest. Articles that are "engineer-techie" go by me in a hurry, although I do have a civil engineer working for me who can explain—slowly and patiently—what I do not grasp. However, the January-March 2003 issue contained a lot of information at my level.

I was especially impressed by USMC Major Jeffrey J. Johnson's article on QA/QC (page 16). This is a tremendously weak area that needs a lot of work. Major Johnson's credentials for commenting are impeccable—in Joint Task Force 6 (JTF 6), he saw a long string of engineer construction units pass through and knows whereof he speaks. I would reinforce his statements. At Fort Lewis Range Control, we have—over the past few years—tried to avoid doing much range construction with engineer troop units because QA/QC is so bad. We'd rather not get something built than to go through the agony of dealing with shoddy results caused by inadequate (at best) QA/QC.

Some would protest that this is driven by the nature of the missions we can offer. Units working on installation projects are not deployed; they are coming from garrison and are subject to all the distractions of garrison life. But in the past, I have seen engineer units accomplish great construction planning, execution, and QA/QC on our projects under those identical conditions. It is definitely in the realm of the possible, but it has to happen by intent, skill, and application—not by osmosis. I also note that Major Johnson's comments apply entirely to units that are deployed to JTF 6 and away from garrison, so it's obvious that it's a problem more of organization than of location.

Bottom line: There is a crying, critical need for applied QA/QC in engineer troop project planning and execution.

John Weller
Fort Lewis Range Officer

Improving the Engineer Battalion's Combat Power: Lessons Learned in Iraq

U.S. Army photo by SPC Derek Gaines

By Captain Aaron P. Magan

The 326th Engineer Battalion (Combat)(Air Assault), based at Fort Campbell, Kentucky, is a part of the 101st Airborne Division (Air Assault). On 6 February 2003, the battalion received deployment orders to Mosul, Iraq, in support of Operation Iraqi Freedom. Although the unit accomplished all its assigned missions and suffered no combat losses from a lack of training or resources, its combat power could be far greater. This article examines the successes and challenges of the battalion, based on the current modified table of organization and equipment (MTOE), and offers recommendations as to the direction future equipment fielding plans and training scenarios should take.

Predeployment and Training

With the clarity of hindsight, it is apparent that some of the predeployment preparations and training events were crucial to our success, and others need some refinement. The division conducted a deployment exercise that proved invaluable as it allowed the unit to—

- Verify load plans based on the newly received shipping containers.
- Identify and requisition blocking, bracing, and shoring requirements.
- Sort hazardous material paperwork and packaging.
- Identify and weigh secondary vehicle loads.
- Update deployment equipment lists so that ships and trains could be reserved based on the unit's equipment footprint.

In short, the deployment exercise accurately reflected the complexity of moving an entire unit with all its associated equipment like no combat training center (CTC) rotation or home station field training exercise ever has. In addition, neither CTC nor home station training scenarios accurately reflected the nature of urban combat operations that we experienced in Iraq or the volume of enemy weapons and ammunition caches.

Urban Operations

In urban operations training conducted before deployment, an impregnable position was continually pursued, resulting in a meat-grinder-type of urban operation attack that consumed soldiers at an alarming rate. In actual practice in Iraq, a sniper or enemy position in a building meant that the floor of that building—or more often than not the entire building—was destroyed by a tube-launched, optically tracked, wire-guided (TOW) missile; an AH-64 or OH-58 helicopter; a tank main gun round; a shoulder-launched multipurpose assault weapon-disposable (SMAW-D); or an AT-4 light antitank weapon. It was reassuring to see that commanders did not continue to send soldiers into a faulty urban operations attack as is frequently seen in training.

An exchange training program within the XVIII Airborne Corps should be established between 3d Infantry Division and the 101st Airborne Division where mechanized company teams and light infantry battalions are rotated into each other's home station training scenarios. The CTCs do a better job than home station training at integrating mechanized forces in an urban operations attack.

Explosive Ordnance Disposal

Engineers are masters of the "pop-and-drop" hand-emplaced explosive charges for destroying unexploded ordnance (UXO), ammunition, and equipment in limited quantities. However, when dealing with multiple truckloads of ammunition and equipment, standard methods and techniques do not apply. A poorly constructed shot will only create more problems and scatter the now-sensitized ammunition and explosives over a larger area.

With the manpower limitations of explosive ordnance disposal (EOD) teams, it was not possible for them to inspect and/or destroy every cache, so it fell to the engineers to take over the task. None of the standard engineer courses train engineers to deal with proper destruction of such large caches and, as a result, we have to learn by trial and error. Additionally, engineers are not currently trained in any of the Engineer School courses to identify enemy ammunition and explosives, especially when those items have been involved in fires and engineers are required to recommend which items are safe for removal and which must be destroyed in place.

Engineer units need embedded EOD/UXO experts. Based on our experiences in Iraq, the right number is two per platoon. Possible methods for achieving this goal are a joint training program, an additional skill identifier, a change to the program of instruction in the Engineer School, or a change to the MTOE.

Operation Iraqi Freedom

The actual process of deploying went more smoothly than most expected. The usual inconveniences of delayed planes, trains with the wrong combination of car types, and transloaded ships still occurred. We provided two supercargo personnel to accompany the equipment on the ship and sent two advanced-party personnel to secure accommodations at the destination, but little else could have been done that would benefit the unit during the deployment process.

We recommend that the battalion continue to provide a download, maintenance, and reception command and control node at the seaport of debarkation and possibly expand it to cover the aerial port of debarkation as well. That node requires the battalion executive officer and maintenance officer to be an effective reception, staging, onward-movement, and integration (RSOI) multiplier. When properly resourced, they can track incoming equipment, stage downloaded equipment, organize convoys, manage the driver pool, provide maintenance support, and direct incoming personnel.

Every vehicle needs at least one spare tire, already inflated and mounted on a rim. Upon arrival in theater, the initial convoys were briefed regarding distances, and units were cautioned about desert-specific maintenance problems, such as lubrication and air filters, but road conditions were never specifically mentioned. The combination of poor roads, overloaded vehicles, and the debris of war meant that tires

M-220 TOW missile

were constantly in short supply. A high-mobility, multipurpose, wheeled vehicle (HMMWV) with a flat tire may get soldiers out of the immediate area, but it will not allow them to continue on a convoy for any distance.

HMMWV scissor jacks need to be replaced with tower jacks (sometimes called bumper jacks or shepherd's jacks) because the original equipment is inadequate. *A tire patch kit is also invaluable.* The kits are inexpensive and require little training to use, making them ideal for each platoon to carry.

Tow bars should be authorized at a minimum of one per platoon. Our unit purchased tow chains before the deployment for every vehicle because of a shortage of tow bars. While effective and relatively inexpensive, it is not the safest way to tow a vehicle. *Additionally, each squad HMMWV needs a self-recovery winch to allow for independent operations.*

In the town of Al Kifl, Iraqi forces had prepared bridges for demolition. Engineers were called on to render the demolitions safe and remove the explosives from the bridge. While this mission was safely accomplished, *embedded EOD personnel would have been an invaluable asset for this mission.*

The Iraqi town of Karbala presented a different type of urban operation than we were used to encountering. As opposed to a village of 40 personnel, as is found at the CTCs or at home station, we attacked a city of 700,000. There was no outer perimeter wire or antipersonnel minefields that ringed the city. Instead, units moved from the landing zone directly into the city and faced no opposition for the first few blocks. However, once the units were inside the city, they faced sniper fire, rocket-propelled grenade ambushes, and sporadic mortar attacks. Without the typical array of obstacles, engineers fought as infantry during the attack and provided limited mobility support. They encountered no enemy-emplaced explosive obstacles. Coalition dual-purpose, improved conventional munitions (DPICMs) were the most frequently encountered UXO, but they could easily be avoided by dismounted personnel. All roadblocks were hand-emplaced by locals and could be removed by hand to allow mechanized forces to pass through. The primary method of mobility support provided by engineers during this operation was the use of bolt cutters to gain access into buildings and compounds. Explosives were still used initially to create breaches into walls, but it ultimately proved faster to use a tank main gun round to create personnel breaches. Often the greater engineer mission occurred once the unit had gained access to the compound and discovered enemy caches.

The magnitude of the caches that the Iraqis had hidden within their population centers meant that entire battalions had to be diverted to begin removing enemy weapons, ammunition, and equipment from the city of Baghdad in order to create a safe environment for the civilians in the newly liberated city. Again, engineers made recommendations to the maneuver units concerning which items were safe to transport out of the city and which must be destroyed in place. We underestimated the amount of demolitions and, more specifically, the number of initiating systems that would be required. Many of the caches had been involved in fires, rendering them unsafe for removal.

Locals had begun breaking apart shells, throwing down the fused warhead, dumping out the propellant, and taking the brass shell casing to sell on the black market. This produced large piles of highly flammable propellant that took only one spark to set off, thereby cooking off many of the warheads lying around. This occurred time and time again all over Iraq and required more Class V supplies than we could carry to destroy it all. What could be transported was hauled to a consolidated cache collection point by the family of medium tactical vehicle (FMTV) trucks that augmented the engineer platoons, as well as all available cargo trucks from the brigade.

Unit basic loads (UBLs) must be adjusted to reflect a dual command-detonated initiation requirement using modern demolition initiator (MDI) shock tube/cap assemblies only. In an urban environment, or in an area where we do not control the airspace, we cannot afford to have explosives set off with a time fuse. It is often difficult, and sometimes impossible, to block off every avenue of approach within a city that leads to a prepared demolition charge. Should the primary command-detonation initiating system fail, we are forced to wait until the time fuse detonates the charge. In the meantime, aircraft can fly overhead, or civilians can wander too close to the prepared demolition. In the future, both the primary and secondary initiating systems should be command-detonated. We were unprepared for this, and while we did not have any mishaps, we also did not have enough of the command-detonated initiating systems on hand to prepare each charge as we would have liked.

Line engineer companies were tasked with opening routes that had been bombed by the U.S. Air Force, as well as Iraqi engineers. A line engineer company has the organic assets to fill in a crater and/or create a bypass. Engineers can sweep the area for UXO before the repair begins, but the end result is a road that is a combat trail at best. Although adequate for military vehicle traffic, to include heavy equipment transporters loaded with M1 tanks, it was difficult for civilian traffic to navigate these roads or newly created bypasses. The engineer work line described in doctrinal manuals lagged far behind the divisional maneuver units. This resulted in 101st Airborne Division engineers clearing and repairing routes through the sectors of three different divisions.

The diversity of missions given to engineers in stability and support operations surprised most people. Road repair, chemical spill response, unstable structure demolition, river interdiction, cache destruction and transport, UXO destruction, route reconnaissance and classification, and a number of other tasks forced us to consolidate the engineer company under the engineer company commander within the brigade combat team. Platoon leaders remained with their task forces and took at least one squad with them each day to respond to missions in each task force sector. The rest of the company became general support to the brigade and worked on taskings generated by daily Civil-Military Operations Center meetings.

Often, engineers massed efforts on missions that did not necessarily represent what was typically thought of as the engineering main effort but rather supported the overall information operations campaign. This approach seemed to work well for us in the northern Iraqi city of Mosul. We often tackled easy engineering victories (such as reopening a roadway for civilians or clearing UXO from a school yard) even though there were more important roads or UXO fields. This allowed us to get the local civilians on our side and showed them that we were interested in helping them reconstruct their country.

Future Organizational Structure

With a rapid runway repair box and two Bobcat® skid steer tractors per line company, the division could double its runway repair capability and add enormous utility to the line company and subsequently its supported brigade. The division seized several airfields, three of which required repairs. Currently, only the division's light equipment company has the airfield repair matting and other required equipment. With the proper reinforcement, a rapid runway repair box could accommodate the weight of two Bobcats and reduce the haul requirement to only one additional truck and trailer. Engineer line companies already have the rest of the required equipment (dozer and small emplacement excavator [SEE] truck). Another plus for the Bobcat is that it can be augmented with auger bits to provide dismounted survivability positions, a concrete mixer (which has been required several times during operations in Iraq), a pavement breaker, and other hydraulic tools.

Each platoon needs its own dedicated FMTV dump truck. An unmodified engineer squad HMMWV can safely carry an entire squad. However, three more load categories remain that require transport: the MTOE items, the soldiers' rucksacks and “A” and “B” duffel bags, and the Class IV and V UBL. The trailer (another issue) can safely carry one of those three load categories. The rest is then left behind or strapped to the sides or top of the vehicle or trailer. The right answer is for each squad vehicle to transport the troops and the mission-essential MTOE items (troop seats are removed and replaced with equipment boxes bolted into the vehicle) and use the trailer to haul the Class IV and Class V UBL. The remainder of the MTOE items and soldiers’ bags can then be transported by the platoon sergeant in the platoon FMTV dump truck. Additionally, the truck could be used to support engineer missions when they are attached to maneuver units.

During operations in Iraq, each platoon required the augmentation of a 5-ton-equivalent truck on a daily basis, because they transported enemy weapons and ammunition caches out of the various liberated cities. The ultimate goal should be to resource an engineer platoon for independent operations with the ability to carry all personnel and equipment in a single internal lift.

Line companies should have two additional dozers for a total of four organic dozers to help provide survivability support in the absence of any augmentation. Typically a line company is augmented with a platoon from the division’s habitual corps light equipment engineer company. When this does not happen, the line company’s two dozers will work around the clock and still take a minimum of six days to finish digging in the brigade commander’s priorities for the entire combat team.

An interim solution would be to purchase the excavator that is available from a U.S. manufacturer in lieu of the winch currently found on the back of our dozers. Such an option would force the commander to choose between providing survivability berms with the dozer blade versus providing dismounted survivability positions with the excavator. However, dismounted positions can still be constructed by hand until the dozer arrives, and the previously requested additional two dozers would free up the assets more quickly. In practice, blade assets are used nonstop at the beginning of operations, but that usage quickly scales back after a unit has been in place for a week or more. After the initial flurry of activity, only occasional sanitation trenches and force protection or road repair missions require blade assets.

A HMMWV-based contact truck should be added to the MTOE. Sapper companies currently have their own maintenance sections based on our own battalion internal reorganization. However, they need a HMMWV contact truck as opposed to the older excess commercial utility cargo vehicle (CUCV) that is currently on hand.

The company is one HMMWV short of what is required. The first sergeant needs a vehicle and so does the assistant brigade engineer. Currently, it is one or the other. *The company also needs to be authorized an operations noncommissioned officer (NCO).* Companies in our battalion currently pull the senior squad leader to fill this role.

A platoon-sized Kipper Tool kit would have greatly enhanced the level of support that engineers could have provided for the maneuver commander. Our unit purchased these tool kits using organizational money; however, they should be MTOE items fielded by the Army. Kipper Tool’s base camp construction kit was long overdue, and we used it nonstop in Iraq.

Engineer equipment fielding should be on the same schedule as the supported infantry unit. Currently, engineers are the only habitual slice element that fights dismounted alongside the infantry, yet they are continually left out of the new equipment fielding plans.

We need to maintain a general support engineer team within the headquarters platoon to react to small incidents. There are always brigade-controlled areas such as the brigade support area, brigade TOC, forward area rearming and refueling points, and primary assembly areas where engineers have to go to react to a single UXO incident or provide transport of a few rounds of enemy ammunition. When engineers are consolidated under the engineer company commander, he can dispatch a squad to deal with the smaller engineer missions.

The assault and obstacle (A&O) platoon leader should be made a permanent MTOE position. The line engineer companies have consolidated all engineer blade assets as well as the Volcano mine system into an A&O platoon. In this battalion, each platoon is resourced “out of hide” with a lieutenant as the platoon leader, and the heavy equipment section NCO in charge generally serves as the platoon sergeant. This structure has served us well both in training and in combat. The notion of using the task force or brigade command sergeant major as the synch-dozer never really worked as well as it’s briefed. However, with the dig assets under the control of an A&O platoon leader, we have developed a more efficient survivability section that is capable of simultaneous missions.

Summary

The diversity of missions and extended distances at which engineer units have operated during Operation Iraqi Freedom highlight the need for updating the type of training, organizational structure, and equipment fielding plan. Months—not years—is the appropriate timeline for these changes. There is still time to affect the fight in Iraq and improve the capabilities of the deployed units in this ultimate proving ground for engineers.

Captain Magan commanded B Company, 326th Engineer Battalion, 101st Airborne Division (Air Assault), Fort Campbell, Kentucky, at the time this article was written. He previously served as a platoon leader in the 50th Assault Float Bridge Company, 2d Infantry Division, Korea, and company executive officer and battalion S1, 9th Engineer Battalion, 1st Infantry Division, Germany.

Army divers are a relatively unknown element of the Engineer Regiment. However, they perform many important missions around the world, such as underwater search and recovery, port opening and clearing, river reconnaissance, watercraft maintenance, hydrographic surveys, salvage operations, and underwater demolitions. The divers are a part of the U.S. Army Dive Company at Fort Eustis, Virginia. The company has five dive teams, two of which deployed to support Operation Iraqi Freedom. The following excerpts from journals kept by the authors describe a few of the missions they performed.

544th Engineer Team (Dive)

By First Lieutenant Christopher F. West

The 544th arrived in Kuwait on 30 March 2003 and moved north into Baghdad to link up with the 565th Engineer Battalion at Logistics Support Area (LSA) Bushmaster on 4 April.

9-13 April

We received our first mission from the 130th Engineer Brigade to help with the search and recovery of a shot-down F-18 and its pilot. At the crash site, we were notified that a Navy explosive ordnance disposal (EOD) team and a Marine expeditionary force reconnaissance team were also on-site. The Navy EOD team gave us the locations of the plane wreck and where the Air Force pararescuemen, or parajumpers (PJs), had found the pilot's parachute.

Both the 544th and the Marine team performed a hasty search using a side-scan sonar system. (See note on page 31.) We developed a plan and calculated a search area to look for the body of the pilot. We divided the area so the Marines would work from the south and move north and the 544th would do the opposite. When we recognized an object as a potential priority (such as the pilot, ejection seat, parachute, or cockpit), by means of the side-scan sonar system that parallels the shore in an attempt to locate foreign objects, the 544th would dive and verify each of these potential sites. We pulled out smaller wreckage pieces and brought them to shore. After several days of searching, something that looked like a body was spotted from a helicopter. Divers from both the Marines and the 544th verified that it was the pilot, and a medical evacuation aircraft flew the body back to Tallil Air Base. Later, Navy EOD personnel destroyed the F-18 using C-4, and the 544th disposed of the wreckage it had brought to shore.

Soldiers from the 544th Engineer Team (Dive) move out across the water to conduct a hydrographic survey for an upcoming river-crossing mission.

14 April

The 814th Engineer Company tasked the 544th to link up with the 565th Engineer Battalion to conduct a deliberate river reconnaissance of a potential assault bridge site at Objective Peach. A seven-man element collected shore and water data and took digital pictures of the near and far shores. The end state was a hydrographic survey with DA Form 7398, *River Reconnaissance Report*, and digital photos attached to it.

18 April

The 544th received a mission from the 565th Engineer Battalion to help the 101st Airborne Division recover sensitive items dropped in a canal north of the Karbala Gap. Eight soldiers had fallen into the 30-foot-deep water, following a light medium tactical vehicle (LMTV) crash, and had lost sensitive items. Surface swimmers looked for these objects, but after recovering only four weapons and a Kevlar® suit during the first hour, the team decided to put scuba divers in the water. By the end of the diving day, we had recovered equipment totaling more than $100,000.

23 April

A six-man reconnaissance team traveled with the 565th Engineer Battalion to Tikrit to conduct hydrographic surveys of the largest-ever military river-crossing site. While in Tikrit, the 544th pulled debris out of the work area for the bridge companies and helped the 74th Engineer Team (Dive) render hydrographic surveys.

27-28 April

A 13-diver team spent two days at Engagement Area Chamberlain, cutting four steel I beams with the underwater torch. The team also conducted salvage operations on the new pontoons emplaced by the 671st Engineer Company. A hole in one of the pontoons caused it to sink, and the weight of the sunken pontoon forced another pontoon to sink also. The 671st developed a patch that could be used on the pontoons so they could pump out the water. Once the pontoons were floating, the divers plugged the hole in the one pontoon with a bolt. The entire area was cleared to allow bridging to continue.

4 May

Divers from the 544th met with Iraqi water treatment plant workers to determine the location of potential sea mines to the east of the bridge at Objective Peach. The workers, who spoke fluent English, believed that there were 40- to 500-pound sea mines on the shore but that there were none in the water. The divers used the side-scan sonar to search the area but did not find any mines.

4-9 May

Six divers supported the LSA Anaconda EOD team responsible for ridding the base of all unexploded ordnance (UXO) and munitions. The mission included lifting, moving, and hauling crates of ammunition to bunkers to completely backfill them.

8-12 May

The 544th began pumping water out of the canal just outside the fence of LSA Anaconda to help the 864th Engineer Battalion fill holes in the airfield with concrete and extend the landing strip. The divers were on call 24 hours a day to support this effort and used their new 180-gallons-per-minute pumps to conduct the mission. The trucks needed to be filled an average of six times a day to satisfy the requirement for concrete.

The 544th was tasked to find an area for conducting dive training in the vicinity of LSA Anaconda. A lake in AdDuval was only 15 kilometers away and seemed fairly large, so a team of divers went to determine the feasibility of diving and helocasting operations there. Upon arrival, the divers noticed a large cache of used, unused, unexploded, and exploded ordnance and munitions, which indicated that this was not a good place to dive. However, the team completed a hydrographic survey and determined the average depth of the water to be about 8 feet.

First Lieutenant West is the leader of the 544th Engineer Team (Dive) at Fort Eustis, Virginia. He is a graduate of the United States Military Academy.

74th Engineer Team (Dive)

By First Lieutenant P.J. Inskeep

After arriving in Kuwait on 14 April 2003, the 74th Engineer Team (Dive) met up with the 5th Engineer Battalion on 18 April at the Taji Airfield on the north side of Baghdad.

22-26 April

The team was notified of a river reconnaissance mission on the Tigris River in the vicinity of the city of Tikrit. Two members of the team convoyed to Tikrit with the command element of the 74th Engineer Company (Assault Float Bridge[AFB]), where they linked up with personnel from the 130th Engineer Brigade and the 299th Engineer Battalion and a reconnaissance team from the 814th Engineer Company (AFB). The initial assessment of the damage that two 500-pound bombs had created was that the bridge was blown in two different places, causing obvious structural damage. The current was so strong that we wondered if we could even get a diver down to the bottom. We took the initial data back to the 299th's tactical operations center (TOC), where the commander of the 130th began to devise a plan to fix the bridge. The 74th Engineer Company commander called back to Taji Airfield to prepare the rest of the team for a convoy to Tikrit.

Divers transport gear from the shore to the bridge site where diving is taking place.

Divers emplace detonation cord in preparation for clearing underwater obstacles.

A topographic detachment at 1st Brigade, 4th Infantry Division, headquarters provided the imagery we needed to complete a hydrographic survey. Back at the site, we collected near-shore and far-shore data using our Trimble TSC1™ data collector and took photographs to analyze the best method for clearing a lane for the bridge.

Using the side-scan sonar, we conducted a survey of the bottom of the river. We could see that there were no major obstacles in the middle of the river, but there were about 20 large trees and numerous small bushes in the way of the projected path of the bridge on the far shore. Also, there were two I beams under the surface of the water on the near shore where the bridge boats were being launched. The other boat left to conduct a hydrographic survey of the bridge site using the Global Positioning System (GPS), a high-precision depth finder, and Trimble software to collect the river depth data. After all the data was collected, we rendered the survey for the bridge companies using Terramodel™ software.

Divers from the 74th Engineer Team (Dive) stand on the shore as they watch a bridge blow after a demolition emplacement mission.

Meanwhile, other divers set up a surface-supplied station, which consisted of SuperLite (SL) 17K helmets, a communications box, air supply hoses, and a high-/low-pressure air system. Then, we inspected everything beneath the water and measured the diameters of the trees at their base to start a demolitions plan. We found the water to be about 10 feet at the deepest spot. After assessing the situation, we decided to let surface swimmers measure the diameters of the trees off of breath holds.

While this was taking place on the far shore, we conducted a reconnaissance of the two I beams under the surface by measuring the beams that were above the water's surface. From this, we developed a demolitions plan. We received permission from higher headquarters to set off the demolitions the next morning. One group was to remove the trees from the far shore and another would remove the two I beams. They rehearsed and planned three separate shots.

Two divers in scuba gear placed the charges. The divers had zero visibility in the water and were working against a strong current. The only sense they could use to emplace the demolitions was touch. Each diver emplaced the demolitions on the downstream side of the tree. The demolitions were then held in place by 550 cord (parachute cord), and we had detonation cord already attached to the charge and precut to 15 feet.

Once the demolitions were set, the detonation cord was tied to the tree above the water until the charges were correctly placed. Then surface swimmers ran a ring main to all the charges and tied them in, and we connected the modern detonation initiator (MDI) and ran it to the far shore for detonation. At the same time, we made sure the military police had cleared the bridge. After our first blast went off successfully, we emplaced the next round of charges and set up shearing charges to cut some I beams that had ruined the hull of a bridge boat the day before. The two sites blew simultaneously. The third blast was a single tree. Once the water was cleared, we helped pull the trees out.

27 April

The bridge companies wanted us to blow the rest of the little brush and cut out five light poles. We performed a reconnaissance, came up with a plan, and prepped the demolitions for it. The demolitions had to be in early that day so the bridge companies could rehearse their operations, so we emplaced them and by 0700 were prepared to blow.

One of the divers took on the task of removing the five poles. Having dived in fast current before, he thought it would be best to see if demolitions could be placed at the base of the poles to ensure that they were sheered completely and no longer posed a navigational hazard to the bridge boat operation. A diver went in the water off the Zodiac® inflatable boat moored to a pole. The current was too strong to even get to the pole safely. The diver tried to slide the demolitions down the pole from the boat. However, weeds and brush had been pinned to the pole by the current, which prevented the demolitions from sliding to the base. We decided to try to put another diver in on the pole so he could shimmy down it. Again the current was too strong, and he could not reach the bottom.

We finally decided to cut the poles about 3 feet above the water and see if they were hollow. If they were, we could pack C-4 inside them and remove them with no problem. We took out a boat that a mechanic with the 74th had repaired—one that had belonged to Saddam. (We didn't think he would mind if we borrowed it to help his people!) On the boat, we set up an oxyacetylene cutter, and another boat was set up to pull the light pole away from the cutting boat so no one would get hurt. Once the poles were cut, we discovered they were hollow. We put charges inside each one, packed them with dirt and water, and blew them that night. The poles were removed, and the site was ready for the bridge.

28 April

Bridge construction began. We had a boat upstream and another downstream from the bridge, searching for enemies on the water. We also had an emergency surface swimmer ready in case anyone fell in the water and a scuba diving station set up as a quick-reaction force. The team searched the river, reporting every half hour. They spotted a couple of fishermen, but nothing serious. By 1300, the bridge was completed and we were pulling security up- and downstream from it. We did it during the daytime, and the infantry took over at night.

6- 8 May

We conducted our final day of reconnaissance for the destruction of the two Tikrit Bridge spans. One diver rappelled underneath the bridge to estimate what needed to be done. After receiving the demolitions from the 814th and 502d Engineer Companies, some of us were assigned to the near-shore span and the others the far shore. In emplacing the demolitions, our only problem was how to attach them to the bridge without causing further damage to the spans. The first explosion was a success; each span fell as we expected and no further damage was done to the bridge. We cleared the bridge and prepared demolitions to destroy the near shore span. When we set off the demolitions, the span was destroyed and the 38th Engineer Company (Medium Girder Bridge) began to emplace the Mabey-Johnson bridge.

9-11 May

A Black Hawk had crashed into the Tigris River near Samarra, and we searched for sensitive items. The divers also searched inside the helicopter for personal items of the pilots. Unfortunately, we discovered that all four men had died. (Their Kevlar suits were used the next morning for a memorial ceremony.) Later, we rigged up the helicopter to a crane and pulled it out of the water. We gathered all the bits and pieces that floated downstream and collected the data needed for a hydrographic survey.

14-15 May

We cut down I beams that were in the water so the 38th could use them for the Mabey-Johnson bridge. The men set up a surface-supplied station, brought out the hydraulic cutter, and went to work. The water was only 10 feet deep, but they could only see inches in front of their eyes. The small amount of oxygen on hand meant they could only cut down one I beam each day.

20 May

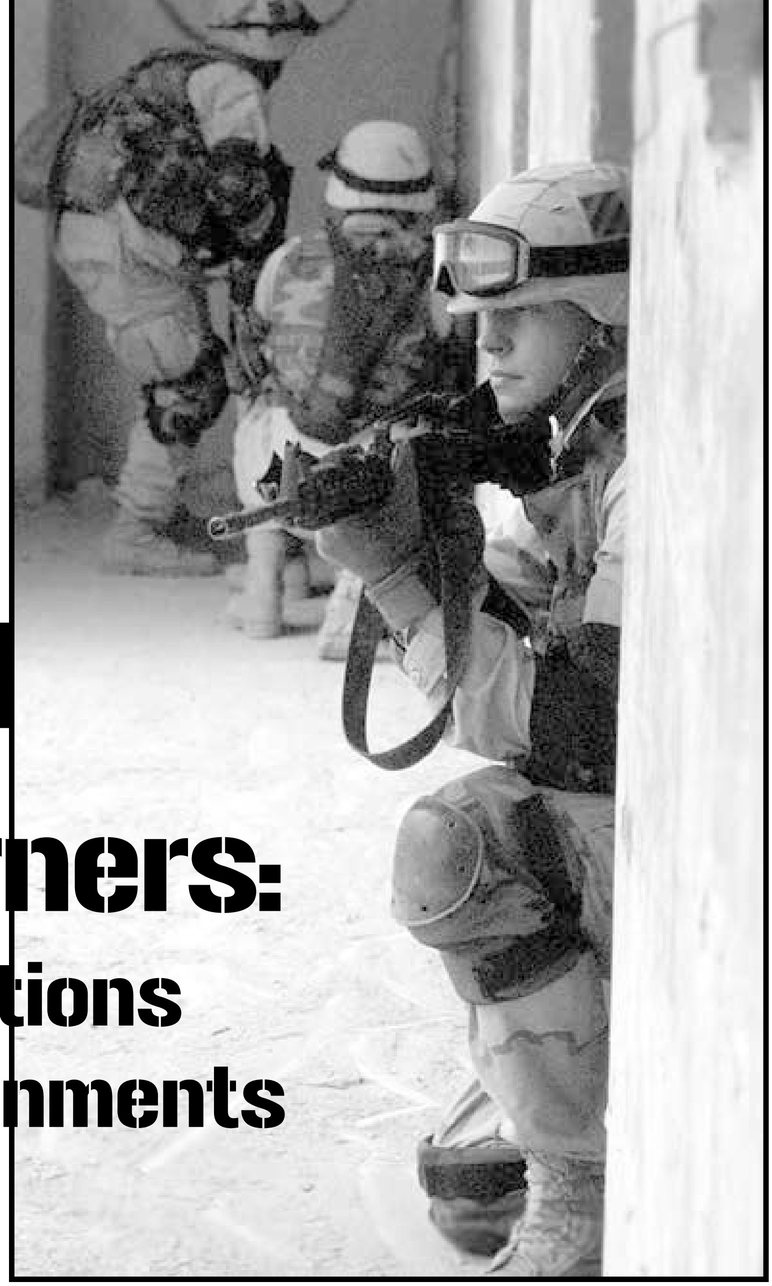
We found another lake within the compound. The divers located weapons and ammunition, which were taken to Tikrit North Airfield and disposed of.

First Lieutenant Inskeep is the leader of the 74th Engineer Team (Dive) at Fort Eustis, Virginia. He is a graduate of the United States Military Academy.

Both the 544th and the 74th Engineer Teams (Dive) continue to perform their unique missions in the barren regions of Iraq. In spite of the frustrations, the soldiers are experiencing satisfaction from a job well done and knowing that they are contributing to the very important Operation Enduring Freedom.

Note: *The side-scan sonar is a method of underwater imaging that uses sound rather than light. The system consists of a processing unit above water, a cable for towing and electronic transmitting, and a unit beneath the surface (a towfish) that transmits and receives acoustic energy (sound) for imaging. The system was originally designed for ocean archeology, but its military application was recognized early on. The towfish, which looks like a 4-foot torpedo, contains a transducer and receiver that exchange signals within nanoseconds, using the speed of the boat and a GPS to create a picture on the attached computer. While the towfish is being pulled behind the boat, the transducer on either side of the towfish generates a half-inch sound signal. What is actually seen on the screen is sound waves bouncing off objects and creating shadows. The side-scan sonar, which is best used to find large objects, has made river reconnaissance quicker and safer, as well as making searches in larger bodies of water more accurate and more efficient.*

Breaching Around Corners: Engineer Operations in Urban Environments



By Lieutenant Colonel Anthony C. Funkhouser

The Department of Defense and the Army recently published new strategic-, operational-, and tactical-level doctrine for urban operations: Joint Publication 3-06, *Doctrine for Joint Urban Operations*; Field Manual (FM) 3-06 (Doctrine Review and Approval Group [DRAG]), *Urban Operations*; and FM 3-06.11, *Combined Arms Operations in Urban Terrain*. The Army has long published doctrine on military operations on urbanized terrain (MOUT), but the previous doctrine was typically constrained to tactics, techniques, and procedures at the brigade level and below. The doctrine was flexible and allowed commanders the option to enter a city or isolate it and bypass. Due to the complex nature of urban operations, commanders typically opted to isolate and bypass. However, this may no longer be a solution. We now face adversaries that use asymmetric tactics and/or terrorism because there are few who can directly oppose America's combat capabilities. Future threats may use cities to negate our technological advantage and use the civilian population to impede and complicate operations. Commanders may enter cities to pursue the threat or to seize intermediate objectives. For this reason, it is imperative that engineers understand the potential problems under all these circumstances.

The newly published doctrine provides a new urban operational framework—*assess*, *shape*, *dominate*, and *transition*. This provides a means for the commander to frame how he visualizes, describes, and directs the urban fight. The two new Army manuals provide limited considerations for engineer missions. Many of our maneuver peers, and even engineers, think of engineer operations as solely limited to combat operations (mobility/countermobility/survivability). However, at the operational and tactical levels, engineers provide significant contributions from the geospatial and general engineering functions. The following paragraphs describe some additional battle command considerations for engineer operations in urban terrain. This article examines the *assess* portion of the urban framework as a primer to stimulate thought.

Engineers in MOUT

As the commander frames the urban fight, he begins with an assessment of the terrain, the threat, and friendly capabilities.

See the Terrain

The complexity of urban terrain demands map products that provide a common operational picture for the commander to visualize the urban three-dimensional terrain. The National Imagery and Mapping Agency, Alexandria, Virginia, produces urban terrain imagery. There are a number of commercial off-the-shelf software products like FalconView™ and Tactical Operational Scene (TopScene™) that use satellite imagery and allow a fly-through capability. However, these products do not provide detailed infrastructure information such as utilities, sewer systems, and bridges. This important information that maneuver commanders need to make informed decisions can be accessed through the U.S. Army Corps of Engineers Topographic Engineering Center, Alexandria, Virginia, which has developed an Urban Tactical Planner software program intended to support MOUT. It is a compact, field-ready suite of urban terrain data and geospatial analysis tools. These tools facilitate rapid visualization of key aspects of the urban environment, including buildings, roads, railroads, streams, forests, marshes, water bodies, and vertical obstructions. It uses streamlined data sets to provide the greatest amount of data in a small, easy-to-use package. The product is designed to be produced on short timelines to meet contingency planning requirements as they arise. Urban Tactical Planner provides an overview of the urban terrain in the form of maps, imagery, elevation data, perspective views, handheld photography, video clips, scanned building plans, tables, and text. The data is structured for use with ArcView® 3.0a Geospatial Information System (GIS) software—the most common commercial off-the-shelf desktop GIS. ArcView 3.0a, the basic software used by the Army's Digital Terrain Support Systems, allows terrain teams to manipulate data and apply unit-specific control measures. The Topographic Engineering Center provides databases for many cities on its Secret Internet Protocol Router Network (SIPRNET) Web site at <*tec.smil.mil*.>

Soldiers operate in the confined space of a MOUT environment.

> "Engineers enable maneuver commanders freedom of maneuver within the urban environment to accomplish their mission."

See the Enemy

As we examine the threat in the urban environment, we know that no matter how a threat fights (whether from house to house or in concentric circles or concentric circles with strong points), the maneuver commander will face the challenges of moving through a dynamic environment filled with complex obstacles. Urban obstacles may include existing debris, furniture, vehicles, wire, and rubble. These alone hinder the maneuver of units but are complicated with the movement of civilians throughout. Civilians can be considered dynamic impediments to maneuver and must be influenced away from the route. To complicate matters even further, the threat may introduce mines and other improvised explosive devices (IEDs). No longer in a two-dimensional plane, mines not only may be placed under roads but also may be positioned for a side or top attack mode that is command detonated or activated. Antipersonnel (AP) mines, IEDs, and booby traps may also be used in many areas, buildings, and other likely avenues of approach.

Recent urban combat experiences in Northern Ireland, Grozny, Jenin, and Afghanistan reveal an accelerated adaptation to countermeasures developed by friendly forces. The threat will also adapt and use IEDs to complicate our detection and neutralization efforts. Examples of recent IEDs found around the world include remote detonation devices using electronics, radio control, or even cellular telephones to initiate the systems. These methods are all shared via the Internet. So what British Forces encounter in Northern Ireland may soon confront our soldiers in another urban area of operations. Some current IED techniques are as follows:

Coupling. One mine or explosive is linked to another, usually with a detonating cord. When the first device is detonated, it detonates the linked explosive. This technique is often used to defeat countermine equipment such as mine rollers. When the linked devices are directional fragmentation mines, they can create a large, lethal engagement area.

Boosting. Buried low-metal mines are stacked atop one another, and the farthest mine from the surface is fuzed. This reduces the probability of detection and increases the force of the blast.

Sensitizing. This technique is used with antitank (AT) mines. On some nonmetallic AT mines, the pressure plate can be cracked and the spring removed to reduce the pressure required to initiate the mine. Similarly, the pressure plate can be removed from metallic AT mines for the same effect. Alternatively, a pressure-fuzed AP mine can be placed atop an AT mine thus creating a very large AP mine.

Daisy-Chaining. Command-detonated AP mines are commonly used in daisy chaining. Enemy forces link the mines with trip wires or detonating cord. When the initial mine is detonated, the other mines will detonate. This creates a large, lethal engagement area.

The threat will also take advantage of survivability within the urban environment by digging in open areas and using existing infrastructure to conceal positions. We can expect the threat to maintain mobility between positions to interdict friendly lines of communication and to reinforce his own positions. FM 3-06 (DRAG) highlights that historically, the threat will resist his own isolation more than any other friendly effort. Since we can never achieve a 100 percent isolation, the resulting movements impact on potential future maneuver operations.

Another key to understanding an urban environment is assessing the threat's general engineering capabilities. Adversaries have general engineering capabilities in their own forces or host nation to maintain utilities and infrastructure. They have access to commercial equipment and experts to repair destroyed targets. As friendly forces target and destroy utilities or reduce their capabilities, the threat may dispatch its own forces to rapidly repair or improvise a means to maintain the capabilities we are attempting to eliminate.

See Yourself

We will seek to maintain freedom of friendly maneuver and deny threat movement throughout the urban terrain. Engineers enable maneuver commanders freedom of maneuver within the urban environment to accomplish their mission. The fundamentals for success will be our ability to—

- Predict actions and circumstances that could affect maneuver.
- Detect using early indicators of impediments.
- Act early to prevent potential impediments from affecting maneuver.
- Avoid impediments by identifying alternate routes.
- Neutralize by reducing or overcoming impediments.
- Protect the force against the effects of threat and impediments.

Friendly capabilities vary by unit. What friendly assets allow us to achieve these fundamentals? Prediction capabilities include all the intelligence, surveillance, and reconnaissance capabilities within the organization but may be dependent on human intelligence. Current detection capabilities are limited for operations within the urban terrain. Capabilities include dozers with mine-clearing armor protection, robotics such as the Matilda, the Improved Vehicle-Mounted Mine-Detection System (IVMMDS), sappers with mine detectors such as the AN/PSS-12 or Handheld Standoff Mine-Detection System (HSTAMIDS), and coalition and/or contracted mine dogs.

Mines and booby traps are never more difficult to detect than after they are emplaced; that is why prediction and interdiction or prevention are so important. These detection assets are extremely limited within the engineer inventory, and operations within multiple or major urban areas will exhaust detection capabilities quickly. Detection training will need to occur before deployment as well as in theater to train on the adaptive enemy's techniques.

Neutralization capabilities include mine-clearing line charges (MICLICs), Panthers, plows/rollers, mine flail systems, the Antipersonnel Obstacle Breaching System (APOBS), launched grapnel hooks, explosive ordnance disposal (EOD), specialized equipment and training (sets, kits, and outfits), ladders/bolt cutters/rescue saws, and contract support for additional capabilities. None of these systems by themselves can do it all, but good engineers will determine what combinations of resources are available to accomplish the mission. The combat engineer vehicle (CEV) no longer provides rubble removal under armor. It is questionable whether the M9 armored combat earthmover (ACE) has the mass and traction to push rubble. Therefore, we need to explore other options. In Jenin, the armored D9 dozer has proved its worth in the urban fight. However, if it is not available, could we integrate an M88 recovery vehicle forward to lift vehicles out of our way when a blade vehicle may not have room to displace the rubble or other material?

Also, how do we work with EOD units forward and leverage their capabilities to identify, render safe, and dispose of unexploded ordnance (UXO) and IEDs to minimize collateral damage? Engineers must work with EOD personnel early in the planning phase to organize and delineate responsibilities for the execution of mobility operations. Potential operations may have engineers detecting, marking, and bypassing IEDs, allowing EOD personnel to render them safe and minimize harm to civilians in the area. Civilians will be a significant issue for our forces. They may not move to relocation areas and will be intermingled with our adversaries throughout the areas of operation. So what assets are available to move civilians from potential maneuver routes?

Nonlethal weapons may also provide an option to the commander, depending on the situation. There are a number of systems available that the military police have proponency for. (For more information, see *Military Police, The Professional Bulletin of the Military Police Corps*, April 2003). Therefore, engineers will have to work closely with the military police as we develop courses of action to deal with civilians along our routes.

Other Considerations

Other friendly force considerations include providing force protection, solving logistical issues, minimizing collateral damage, and accessing expertise to remote areas.

Force Protection. A major concern for all commanders is force protection of all these unique capabilities. In a three-dimensional environment, a unit's flank is always exposed to a potential threat. Therefore, as we maneuver through the urban environment, engineers need to simultaneously conduct countermobility operations to protect the flanks within a compressed area of operations. Protection of engineers will be vital as they are exposed to a wide range of IEDs. Concurrent training for engineers and maneuver forces on the most recently identified threat capabilities in the area of operations will improve protection of engineers and the combined arms team. Another lesson learned from Jenin and Grozny is the removal of all flammable materials from the outside of combat vehicles. Urban forces should consider increasing their requirements for fire extinguishers as the potential for fire increases in the urban area.

Logistics. Historically, certain key classes of supplies are consumed at a higher rate in urban operations—as much as five to ten times normal consumption rates. As a result, friendly forces can anticipate an increased logistical requirement for hauling supplies for urban operations and moving critical engineer assets. Since engineers tend to use large items for barriers in isolation operations, acquiring dedicated assets may become a problem. Engineers will have to be resourceful and use existing materials in the urban area to their advantage. It may require "urban foraging," which can range from contracting materials to confiscation. Engineers should conduct a thorough assessment of the urban area to identify potential locations for engineer equipment and materials to reduce haul requirements.

Collateral Damage. Collateral damage alters the urban landscape and may harm civilians. It may also impede movement along previously cleared routes and affect civilian behavior and movement. Therefore, engineers—as the terrain experts—should anticipate where collateral damage may occur and predict the impact on future operations. This engineer battlefield assessment capability may have direct influence on priority intelligence requirements and the entire force. This is no easy feat, but it is one that engineers will be expected to perform.

The Engineer Research and Development Center, Vicksburg, Mississippi, has a new software program called the Simplified Survivability Assessment that captures information and technical data from Technical Manual (TM) 5-855-1, *Design and Analysis of Hardened Structures to Conventional Weapons Effects*. The software allows users to calculate the potential damage created by various weapons on a variety of structures, estimates the protection required against various weapons, calculates overhead cover, and includes a survivability timeline program.

Friendly Capabilities. When assessing our friendly capabilities, we must examine our general engineering capabilities and requirements. General engineering will occur throughout the urban fight and may be the main effort during stability and support operations. As General Krulak, United States Marine Corps, said, "In one moment in time, our service members will be feeding and clothing displaced refugees—providing humanitarian assistance. In the next moment, they will be holding two warring tribes apart—conducting peacekeeping operations. Finally, they will be fighting a highly lethal midintensity battle. All on the same day, all within three city blocks. It will be what we call the three-block war."

We cannot expect civilians to leave cities. They will remain in their homes, and their requirement for services such as food, shelter, water, and medical treatment may outstrip our capability to provide. Therefore, we may be responsible for requirements such as sewage, electricity, and public order. Many engineer units located at echelons above corps, such as engineer commands, may be available to provide specialized capabilities and assist in these missions. If construction engineers and civil affairs personnel are not available immediately after combat operations, then units and combat engineers must initiate general engineering operations for stability or support operations.

Another general engineering capability available to the operational commander is field force engineering—a reach capability by deployed forces to the engineer commands, the U.S. Army Corps of Engineers, and even the Engineer School for virtual collaboration. This allows access to services and technical expertise to these geographically dispersed units in the field.

Summary

As you can see, many engineer requirements have second- and third-order repercussions that the commander must think through. The same process for the engineer battlefield assessment and military decision-making process applies to urban operations, but now we need to consider how the new threat will fight and what new capabilities we have. When the mission finally concludes, engineers must be prepared to transfer functions and responsibilities from military to civil authority or to another agency. This article provides a means to begin thinking through the urban fight and how engineers will make their contributions.

Lieutenant Colonel Funkhouser commands the 5th Engineer Battalion in Iraq. Previous assignments include Chief, Doctrine Development Division, U.S. Army Engineer School, Fort Leonard Wood, Missouri. In that capacity, he spent three months with the Battle Command Training Program-Operations Group F, specializing in urban operations. He also participated in the United States-Israeli Urban Operations Work Group in Tel Aviv, Israel.

Photos by SGT Kevin Doheny, 19th Public Affairs Detachment

36th Engineer Group Conducts Somber Mission

By Captain Brian Chapuran

The soldiers of the design management section of the 36th Engineer Group from Fort Benning, Georgia, are often tasked to survey sites. It is a mission they have done hundreds of times in preparation for various construction missions. The mission they executed on 19 May 2003, however, was anything but normal. Two surveyors and a civil engineer had the somber mission of siting and marking a gravesite. It was the location where Iraqi captors had buried nine U.S. soldiers, members of the 507th Maintenance Company who were captured when their convoy was ambushed. Almost every American has heard the story of Private First Class Jessica Lynch and her dramatic rescue from the hospital in An Nasariyah. The nine soldiers were with Private First Class Lynch when they were captured, but they were not as fortunate as she. The soldiers were killed and their bodies buried in a shallow grave just outside the hospital.

After the bodies were discovered, detailed information about the site needed to be recorded. At this point, the 36th Engineer Group was asked to provide its technical expertise. There were two main reasons to locate and mark the site. The first was to begin the process of designing and possibly building a memorial to the soldiers. The second reason for the mission was to assist in the investigation of war crimes. The information gathered by the 36th Engineer Group will be used by the U.S. Army Criminal Investigation Command as part of its investigation into potential war crimes committed by the former Iraqi regime.

The 36th Engineer Group commander saw the mission as a necessary and unforgettable task in the aftermath of war, yet one more reminder of the ultimate price some have paid to ensure that the principles of freedom are made available to all people. The soldiers from the 36th Engineer Group were proud to put their skills and expertise to use for a mission they probably never envisioned and will never forget.

Captain Chapuran is currently the trial counsel for the 36th Engineer Group and the 11th Infantry Regiment at Fort Benning, Georgia. During Operation Iraqi Freedom, he served as judge advocate, public affairs, and civil affairs officer for the 36th Engineer Group.

Transforming the Light Equipment Company

By Captain Paul J. Kremer

The engineer company, light equipment, is undoubtedly one of the most versatile units in the Corps of Engineers. The variety of missions the company can accomplish epitomizes the resourcefulness of the entire engineer force. While exceptional in capability, the light equipment company must look to the future to ensure that it continues to meet the maneuver commander's needs. Through evaluation of the training in preparation for deployment to support Operation Iraqi Freedom, and the performance of the unit in theater, we in the 887th Engineer Company (Light Equipment) (Air Assault), Fort Campbell, Kentucky, have developed recommendations for the light equipment company of the future. We believe that a new modified table of organization and equipment (MTOE) should be developed, since the last complete revision was in 1983, so the light equipment company of the future will be an even more versatile asset for the Army.

Definition

The MTOE defines a light equipment company as a unit designed to augment a light engineer force. Additionally, one of the main missions of the 887th Engineer Company and the 618th Engineer Company (Light Equipment) (Airborne), Fort Bragg, North Carolina, is airfield damage repair (ADR). Both units repair airfields for the XVIII Airborne Corps. One of the companies has been attached to the 82d Airborne Division and one to the 101st Airborne Division (Assault) since 1986.

Equipment

When looking at the company motor pool, the light equipment company could be defined as a horizontal construction company with equipment that is downsized from that of a combat heavy company. For example, the light equipment company has 613B versus 621 scrapers, 5-ton versus 20-ton dump trucks, and 2.5-cubic-yard versus 5-cubic-yard loaders. The company is a construction asset that can quickly augment a light division with all the main supply route (MSR) construction/repair assets it needs—in addition to being able to quickly "open the door" for a rapid deployment force by repairing airfields for follow-on forces to flow into a forward operating base.

Training

Training is without question the key to success in combat. In preparation for the deployment to Iraq, the 887th focused on two main areas in the 6 months prior to receiving the deployment order: training on the mission-essential task list (METL) and training on the actual task of deploying.

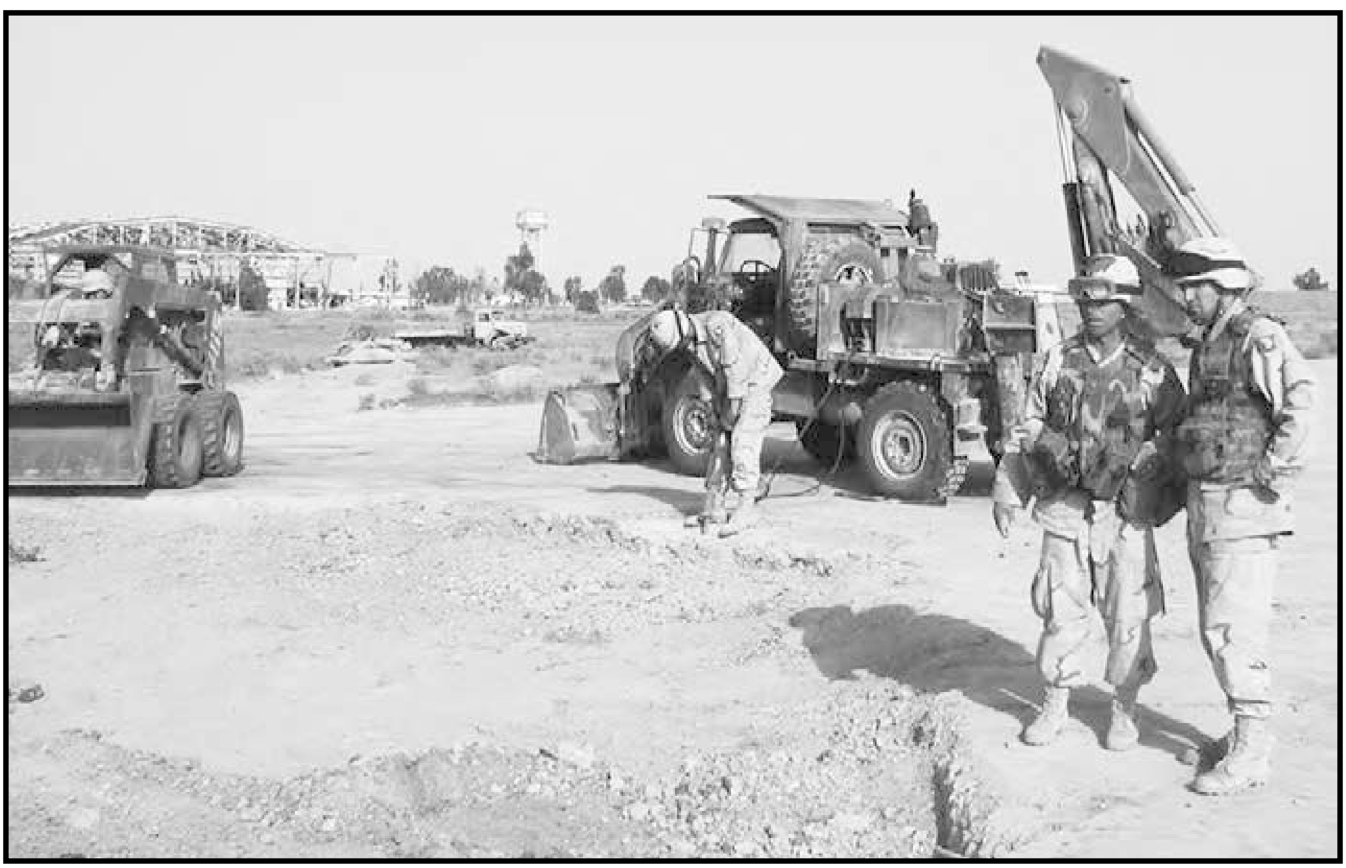
Mission-Essential Task List

Quality time spent practicing the unit's METL is invaluable because it is what keeps soldiers alive as they accomplish missions. The 887th was able to deploy as trained (T) in seven of its eight tasks. The unit trained almost year-round since it does not have a habitual association with a maneuver brigade and therefore does not repeatedly enter into a "tasking" cycle. In addition, enlightened leaders tasked the 887th to work construction projects for the post instead of performing nonengineer tasks. Each year, the countless post projects the unit completed ensured that operators refined their skills. From the METL, there were some tasks that proved essential for combat.

Convoy Live Fire. In the 12 months before deployment, the 887th conducted four convoy live-fire exercises. Each platoon conducted one of these 24-hour events that incorporated a dry blank live fire, day and night sequence of events. As additional challenges for the convoy commander, the exercises also included OH-58D helicopter support—a real-time 9-line request for medical evacuation using the post's UH-60s; nuclear, biological, and chemical scenarios; and vehicle breakdown scenarios. The leadership was fully tested under constantly changing conditions with live ammunition during both daylight and darkness. The leadership training was crucial to our future success in Operation Iraqi Freedom. Little did we know that we would be convoying more than 1,100 kilometers along future MSRs in Iraq. Since every mission required convoying to the mission site, this training was validated on a daily basis.

Airfield Damage Repair. The task the unit wanted to be absolutely 100 percent prepared for was ADR. In the year before deployment, 3d Platoon spent 6 months in Kandahar, Afghanistan, making daily repairs to the airstrip. The hands-on experience made them ADR experts. To ensure that the rest of the company also achieved the highest training levels, the company planned three ADR exercises off post. Over the course of 5 months, the 887th sent platoons to Malmstrom Air Force Base, Great Falls, Montana, to train with the 819th RED HORSE; Fort Bragg, North Carolina, to train with the 20th Engineer Brigade; and Germany to train with the Southern European Task Force. Training with rapid deployment engineers from both the Army and Air Force allowed the 887th to display its skills on ADR as well as watch the other units perform their battle drills. Once the training was completed, the 887th knew it had the best-trained and most experienced ADR experts in the armed forces.

Combat Lifesaving. Combat lifesaver training should be required of every company on a quarterly basis. For the 887th, the week-long training proved its worth. The company suffered several injuries over the course of 2 weeks during Operation Iraqi Freedom, including cutoff fingers; an unexploded ordnance explosion causing shrapnel wounds and lost toes; and an enemy grenade attack on a stopped vehicle, which caused extensive shrapnel wounds to a soldier. But amazingly,



Soldiers from the 887th Engineer Company use a small emplacement excavator (SEE) and a Bobcat® to repair a crater in an airfield in northern Iraq.

not a single soldier was killed during these incidents. Combat lifesavers were on the scene in each instance, and without question they saved lives. It was difficult to have soldiers injured, but it would have been tragic for them to die.

Deployment Exercise

In November 2002, the 887th was directed to conduct a deployment exercise, which would become one of our best training events to date. The exercise required that we fully upload and roll everything out of the motor pool; move to a scale house for weigh-in; and have the vehicle secondary loads inspected, which included preparing hazardous material (HAZMAT) paperwork. At the end of the exercise, we would be ready to load the train in preparation for war and have an extremely accurate automated unit equipment list/deployment equipment list.

The 887th spent a week conducting the deployment exercise as the company prepared more than 100 vehicles to move. As the unit left the motor pool, it was simple to verify the accuracy of the non-mission capable (NMC) report—an additional bonus before deployment. As the unit moved through the various stations, it became obvious which HAZMAT teams were best, who packed their secondary loads best, and what load plans needed refining. Having railroad company personnel at the last station to inspect the vehicles was essential to success. They showed us what would not pass their inspection team in the future and helped the unit executive officer replan a few secondary loads. Once the exercise was complete, the company knew how to upload for war and how long it would take, which unit movement officer and HAZMAT teams were best, and that the company master load plan was accurate.

After conducting quality training for 18 months and completing a highly successful deployment exercise, everyone knew we were ready for combat—that we could get to war in a well-planned, well-rehearsed manner and subsequently execute any missions assigned to us once in theater.

Operation Iraqi Freedom

The 887th received the order to move to the rail yard in early February 2003 to began preparations for overseas movement and arrived in theater on 1 March. The company operated over the entire division area of operations, providing the engineer battalion commander the ability to quickly weight any main effort. During the initial assault into Iraq, survivability of forward area rearming and refueling points (FARPs) was key. The 887th assembled all its blade assets and some SEEs to protect them and to dig in command and control nodes. Once in the vicinity of An Najaf, the 101st Airborne Division required survivability support as it reconsolidated. FARPs were constructed, division command and control nodes bermed, borrow pits operated, and Patriot batteries dug in as the 887th received mission after mission.

When the 101st moved to Baghdad, the 887th provided support by clearing 50 kilometers of Highway 8 and 70 kilometers of Highway 1 of all obstacles emplaced by Iraqis and more than 60 vehicle hulks destroyed by the 3d Infantry Division. With the highways cleared, the 4th Infantry Division was able to move into sector along a high-speed MSR during its movement north.

The 101st then began taking successive airfields—Al Iskandariyah, Mosul, Qayyarah West, and finally Tall Afar. The 887th assembled teams for each one, clearing the airfields, sweeping the area for helicopter/Air Force operations, and conducting ADR. As airfield runways were being worked, the 101st also required survivability/force protection support as units closed on those airfields. The 887th again supported that effort. Other missions included hauling rock to projects, clearing airfield hangers, hauling division command post equipment, and constructing/emplacing force protection measures around the base camps.

Future Organization

While the unit was highly successful during Operation Iraqi Freedom, there are always ways to improve. Two problems were obvious after only 2 months overseas: transportation and maintenance.

Transportation

During all phases of Operation Iraqi Freedom, the 887th was required to move very long distances, mostly without additional transportation support. The unit made three moves of 200-plus miles, starting in Kuwait and eventually ending in Mosul, Iraq. Obviously, our construction equipment fleet was not able to drive itself that far, so external transportation assets were required.

The first movement of the 101st to An Najaf went very well, with heavy equipment transport support from the Corps, although the trucks were a week late in arriving because of their nonstop schedule. This delayed much of our equipment from moving north with our convoys of family of medium tactical vehicles (FMTVs) and high-mobility, multipurpose wheeled vehicles (HMMWVs). As the war progressed, we moved to Al Iskandariyah, south of Baghdad, and then on to Mosul, which required that we move via internal lift assets.

The best way to reduce transportation requirements is to reduce equipment. The light equipment company is very large; however, with a few equipment modifications, it could reduce its fleet in some areas but retain almost all of its capabilities.

Graders. The company has nine graders but could accomplish all its missions with eight. More importantly, we should trade all Caterpillar® 130GSs for Volvo G86 graders. Because the G86 is lighter than the 130GS, it can be moved via CH-47 helicopters without sectionalization. The G86 can also use external hydraulic attachments, similar to the Bobcat. One such attachment is a vibratory roller that can be towed behind

The 887th Engineer Company clears battlefield debris (destroyed T-72s) using the company's DEUCEs in the town of Al Mahmudiyah, Iraq, south of Baghdad.

the grader. Multiuse vehicles are the key to the future for the entire engineer force, not just the light equipment companies.

Loaders. The 950BS should be replaced with a smaller loader from the Family of Loaders Operational Requirements Document (ORD) currently being developed at the U.S. Army Engineer School. The light equipment company needs five new loaders from the Family of Loaders ORD that can be moved by one CH-47, air-dropped, and outfitted with other hydraulic attachments (such as concrete mixers, impact hammers, moldboards/blades, and modified scraper bowls) to make it a multiuse vehicle.

Scrapers. The 887th rarely uses scrapers in garrison and even less in combat. The company has nine MTOE scrapers but only deployed with six because it did not expect projects that would require the use of a scraper. After a couple of months in theater, we decided that even six was too many. There is very little possibility of constructing a new airfield, so few scrapers are required in the inventory. Preexisting airfields in every country make it easy for our rapid deployment forces to seize a functional or damaged airfield for operational use. It will always be faster to repair a damaged airfield than to build a new one. Therefore, light equipment companies of the future should only have three scrapers.

Skid Steers. Without question, the 887th could not have accomplished its missions without its six Bobcats—the most important pieces of equipment in the motor pool. As in Kandahar, Afghanistan, they were once again in constant use during the deployment. The unit used the sweeper attachments for everything from clearing airfields of debris to clearing out buildings for tactical operations centers. The pavement breaker, vibratory roller, and combination bucket were used during ADR. The only problem with the Bobcat is the lack of national stock numbers to requisition parts through the Unit-Level Logistics System–Ground (ULLS-G).

Vibratory Rollers. The light equipment company has six CS-433C vibratory rollers, and each of the six Bobcats in the 887th inventory has a vibratory roller attachment. The Bobcat roller is certainly best for repairing small craters on an airfield. Line platoons can survive with only the Bobcat. Support platoons should retain two CS-433C vibratory rollers for the company as a resource for large crater repairs (as experienced at Qayyarah West) and for large-scale compaction efforts on dirt airstrips.

Water Distributors. The current light equipment company has three water distributors. Two of the soon-to-be-delivered 613C models would be more than sufficient. We could have used these distributors constantly during Operation Iraqi Freedom, but we could not have procured enough water and soil stabilization solution to keep three water distributors in use. While the need is great for dust control in any operation (for debris control at airfields and especially for dirt MSRs and shoulders), the resourcing of the material to fill the tank is extremely challenging. A technique for the future is to fill the water distributor's empty tank before deployment with 5-gallon buckets of the soil stabilization solution. Therefore, once in theater the only required resource is water. An even better solution to further reduce the required transportation support is to field two to three skid- or trailer-mounted water tanks with spreader bars and/or sprayer attachments. This would cut the transportation requirement even further with no loss in capability. A pressurized spraying capability would be a significant enhancement to soil stabilization and dust control.

Other Equipment. There should be no change in the M1094 dump trucks, deployable universal combat earthmovers (DEUCEs), M1088 tractors, M984 heavy, expanded-mobility, tactical truck (HEMTT) wreckers, and HMMWVs, as they proved their value in type and quantity. Obviously, the table of organization and equipment (TOE)/MTOE writers should emphasize the need to retain the end strength of the company. Reducing the quantity of equipment and retaining the same number of soldiers and transport assets is essential. The most important weapon system on the MTOE is the soldier, and the unit could not function in theater without each of them. Planning convoys with a shortage of soldiers was extremely difficult. Additionally, trying to support operations on four airfields with a shortage of unit mechanics was a challenging problem to solve.

Providing security for missions further drained the already strained platoons. For several missions within Baghdad, the company had three times as many soldiers in the streets pulling local security as it did on the heavy equipment clearing the roads of battlefield debris. In addition, the battle losses from unexploded ordnance and enemy contact further depleted the ranks since five soldiers who were evacuated to the combat support hospital were losses for the remainder of Operation Iraqi Freedom. For these reasons, the value of every engineer soldier on the MTOE is far higher than any piece of equipment.

Maintenance

After Operation Iraqi Freedom, it is apparent that two fixes are needed to better maintain the light equipment company. The mechanics and noncommissioned officer leadership performed in an outstanding manner and kept the fleet moving, but a few changes would greatly improve the unit.

Hydraulic Systems Test and Repair Unit (HYSTRU) Trailer. The lack of a HYSTRU trailer caused delays in repair times, which hampered the unit significantly.

Direct Support. The light equipment company must have a direct support maintenance section on the MTOE, because it is often impossible to get support.

Summary

The light equipment company is an outstanding resource for the combat engineer battalion to which it is attached. The 887th Engineer Company was able to provide support to any mission required by the 101st Airborne Division. At one point, the 887th had assets at four different airfields, demonstrating the flexibility and capability of the unit. To guarantee its continued usefulness to maneuver commanders, the light equipment company must be transformed into a more rapidly deployable team, in parallel with the rest of the Army. In doing so, the Engineer Corps will ensure that it continues to have the light equipment company as a fully capable—and even more versatile—tool in the force structure.

Captain Kremer is a small-group instructor at the U.S. Army Engineer School, Fort Leonard Wood, Missouri. At the time this article was written, he was assigned to the 326th Engineer Battalion (Air Assault) in northern Iraq. He previously served as the battalion maintenance officer, assistant S3, and company commander of the 887th Engineer Company. Captain Kremer holds a bachelor's in both business administration and computer information systems from Thomas More College and is a graduate of the Engineer Captain's Career Course, Combined Arms and Services Staff School, Battalion Maintenance Officer Course, Sapper Leader Course, Air Assault and Airborne Schools, and Mountain Warfare School.

Operation Iraqi Freedom Warfighter Conference

The U.S. Army Engineer School (USAES) is hosting an Operation Iraqi Freedom Warfighter Conference in conjunction with the Society of American Military Engineers (SAME)/Army Engineer Association (AEA) South Central/South Atlantic Regional Training Conference in Savannah, Georgia, from 3-5 November 2003. Due to space constraints, only formal invitees may attend.

For registration and additional information, please visit the conference Web site at <*www.same.org/savannah/_2003/savannah2003.htm*>. The conference point of contact is Ms. Lindsay Fox at (912) 234-5300 or <*fox.l@thomas-hutton.com*>. The USAES point of contact is First Lieutenant Elizabeth Helland at (573) 563-7293 or <*hellande@wood.army.mil*>.

Helping Iraqis Rebuild Iraq

By Colonel James I. Vosler, Lieutenant Colonel Clarence D. Turner, and Captain Kevin J. Schrock

Task Force Neighborhood, an aggressive community outreach program, was developed by V Corps to help Iraqis rebuild their country. The initiative consists of "task forces" of coalition forces that go into neighborhoods and assist hired Iraqis with projects. V Corps's 130th Engineer Brigade took the lead in this effort. After gathering support from the local communities with these Task Force Neighborhood projects, Iraqis are contracted to develop and execute their own local community repair projects.

The 555th Engineer Group (Task Force Able), sometimes known as the "Triple Nickel," joined 4th Infantry Division forces—explosive ordnance disposal (EOD) and civil affairs teams, interpreters, contracting specialists, and medical/dental, military intelligence, and media personnel—to participate in the infrastructure repair program with reconstruction projects that included the following:

- Removing debris.
- Removing arms, ammunition, and unexploded ordnance (UXO).
- Constructing roads and bridges.
- Assessing facilities.
- Restoring power, water, and sewage treatment.
- Restoring hospitals, clinics, and schools.

Purpose

Specifically, Task Force Able's goal was to reinvigorate the Iraqi labor force to promote an upward trend in the economy and create advancement in civil works and engineering to rebuild the infrastructure of local communities. This enables forward progress in their social and communal

U.S. Army photo by SPC Adam Nuelken

A masonry specialist with Bravo Company, 142d Engineer Battalion, replaces wooden desktops and seats at the school in Al Hurriyah, Baghdad.

living and move toward stability and helps develop a positive perception of coalition forces.

Organization

We are structured to use the enablers to facilitate the rebuilding of Iraq. The use of the local population more than triples the engineer combat power in Task Force Able, enabling platoons to accomplish tasks normally assigned to a company or higher. An example of this is the repair of an eroded causeway of a bridge over the Tigris River. The division of labor for this project consists of 90 percent from local labor and equipment and 10 percent from Task Force Able's organic resources. These resources are organized through community action teams composed of Task Force Able engineers, local labor, and division augmentation. Task Force Able uses community action teams to conduct assessments of the condition of local infrastructure.

Contracting

Putting Iraqis back to work is our main intent. The 555th uses Office of Coalition Provisional Authority funds to hire local Iraqi workers and equipment operators. We also contract for resources such as rock, gravel, and sand to complete infrastructure projects that require them. Some of these projects are for joint use by the Iraqis and U.S. military. For example, the task force hired several former plant workers to fix the water pumps and generators to a water treatment plant in the town of Abu Rajash. This feeds water into the northern Tikrit area and the Al Sahra Airfield, which houses thousands of 4th Infantry Division soldiers. A member of Charlie Company, 223d Engineer Battalion (Task Force Knight), Mississippi National Guard, was able to put his civilian water treatment plant expertise to use and help negotiate the purchase of parts that brought the water treatment plant to full operation.

In addition, personnel from the 14th Engineer Battalion (Task Force Rugged) contracted for 350 loads of rock, gravel, and sand and used 20-ton dump trucks to repair an eroded causeway over the Tigris River. The gravel and sand will also be used to repair road craters in Iraqi Highway 1, which was damaged during the war. The 14th also contracted for equipment to rebuild the causeway—five 20-ton dump trucks, two excavators, two bucket loaders, a fueler, a grader, a water distributor, a roller, and a dozer. Task Force Rugged will provide the remaining equipment necessary for this repair. In addition to the above examples, personnel from the 223d Engineer Battalion negotiated several asphalt contracts to repair the Al Sahra airfield and several large road craters on Iraqi Highway 1 between Tikrit and Mosul.

UXO Clearance

Most of the UXO found in Iraq is submunitions that present a safety hazard to the local communities throughout the country. UXO also posed a similar

U.S. Army photo by SPC Adam Nuelken

A metalworker with the 535th Engineer Company braces a steel door while grinding off the rough spots. Soldiers welded hinges and repaired doors at an elementary school in Al Hurriyah, Baghdad.

hazard to the rebuilding of Highway 1. The 47th Ordnance Company EOD team provided support to remove 150 cluster bomb munitions from three road craters in Highway 1, thus enhancing the safety of the local population. Alpha Company, 14th Engineer Battalion led a mine-clearing armor-protected (MCAP) D7 dozer crew to further clear the route. Additionally, Bravo Company, 14th Engineer Battalion, and the 47th EOD team cleared 51 cluster bomb munitions from a local community (Tall ath Thahab), enabling them to once again use the land for farming.

Engineers

The Task Force Able engineers repaired a local water treatment plant, constructed an improved ribbon bridge across the Tigris River, completed a 500-meter bypass on the Buffalo Soldier Bridge, repaired several major road craters on Iraqi Highway 1, constructed a landfill, and replaced windows in the Tikrit hospital. The 565th Engineer Battalion (Provisional) (Task Force Renegade) constructed an improved ribbon bridge that provided assured mobility for U.S. forces

U.S. Army photo by SPC Joshua Hutcheson

Soldiers from Bravo Company, 37th Engineer Battalion, Fort Bragg, North Carolina, stand at the bottom of a 20-foot-deep crater made by an American bomb at an airfield in northern Iraq.

and the Tikrit community. Alpha and Charlie Companies of the 14th Engineer Battalion constructed a 250-meter causeway for this bridge. Following its completion on Saddam Hussein's birthday, the bridge was named the "Birthday Bridge."

Similar to this project, the 14th Engineer Battalion established a contract with the community of Az Zawiyyah to restore the causeway on the Buffalo Soldier Bridge. On 25 May 2003, the battalion completed work on a 500-meter two-way bypass on the southern side of the Buffalo Soldier Bridge causeway, 20 kilometers north of the city of Bayji, Iraq.

This project was undertaken to provide assured mobility across the Tigris River for Task Force Iron Horse and the local community. Before the bypass was completed, access to the bridge was via a rapidly eroding causeway that barely permitted one-way traffic. If this causeway failed, the nearest passable bridge would be in Tikrit, 60 kilometers to the south. Completion of this project ensures that the people of Iraq have a safe means to cross the Tigris River near Bayji.

The Bayji bridges, 9 kilometers to the south, were destroyed during Operation Iraqi Freedom. Charlie Company, 14th Engineer Battalion, undertook this project, which is only the first phase in repairing the causeway to full use. Later phases, which will be accomplished using mostly contracted labor and equipment, include measures to prevent future erosion and reconstruction of the original causeway, thus returning to the Iraqi people a vital lifeline across the Tigris River. Initial construction on the bypass was started on 5 May 2003, enabling one-way traffic. The battalion closed off the causeway and began rebuilding it with the use of Iraqi workers and equipment on 7 June 2003. This causeway is also of vital interest to Task Force Iron Horse as it is one of the division's alternate supply routes.

The 14th Engineer Battalion is repairing Iraqi Highway 1, just north of Bayji. The project is broken into four zones. Before the repair of Zone A, this section narrowed to one lane around one 15-meter-wide hole and a smaller 5-meter-wide hole, the results of an aerial-delivered bomb. A collapsed concrete box culvert that ran beneath the southbound lane complicated the repair. The culvert was demolished using explosives, then it was removed and replaced with new culverts to restore water flow beneath the route. In lieu of box culverts, we used round culverts and sandbag headwalls. Then the crater, along with collateral damage, was filled and compacted to accept traffic.

This is the first of four such repairs planned by the 14th Engineer Battalion. The remnants of an aerial-delivered bomb complicated the second set of craters, Zone C. More than 150 cluster bomblets were destroyed by the 47th EOD team to set conditions for future repairs. Completion of this project removes a bottleneck and ensures that the primary V Corps north-south main supply route remains open as a high-speed line of communication. It also facilitates the use of Highway 1 by local travelers. The use of local materials and equipment on the project is another example of the division's efforts to help Iraqis rebuild Iraq. This repair also prepares this section of Highway 1 to be repaved, restoring it to preconflict condition. The 14th also constructed a city landfill for a local community, just northwest of Tuz, Iraq, which will prevent random dumping of trash in the nearby community.

Infrastructure Assessments

The 14th Engineer Battalion conducted several infrastructure assessments during Operation Iraqi Freedom, which are used to identify future projects. The primary goal was to assess the condition of power, water, oil/gas, and infrastructure using the red, amber, and green rating method. These ratings allow Task Force Able engineers to prioritize future work. The assessments are used to hire local Iraqi workers and equipment, utilize troop labor and equipment, or seek a private cooperation to conduct the repairs.

Bravo Company, 5th Engineer Battalion (Task Force Fighter), conducted the following assessment of the Az Zawiyyah.

General

We entered the town and looked for an English-speaking man. We were approached by a man who worked at the Bayji refinery and lives within the town of Az Zawiyyah. He is the nephew of the town sheik, who lives farther east within the town (no location given). After a tour of the local water plant, the town deputy mayor, who spoke very good English, approached us. He was a colonel in the Iraqi Helicopter Corps during the war.

Utilities

- ***Water.*** *The water-pumping facility consists of four pumps from the Tigris River to two (30' x 8' x 15') holding tanks. Connected to the holding tanks are two chlorine-filtering tanks. Water distribution to the town itself consists of two pumps from each tank to the town. Currently, only one pump from the river works. However, there is no filtering of the water, and only one pump to the town actually works. The water pressure to the town is currently two bar (mostly gravity fed). Due to the poor quality of water, most of the town is suffering from dysentery, and a large portion of the town funds are going toward medicine to treat the illness. We have hired two local plumbers to fix the pumps. We have also hired personnel to add 12 kilometers of piping to provide water to the remainder of the town.*
- ***Electric.*** *The overhead power lines were strung in the 1970s and are in disrepair. Due to the problems with the power grid, there are daily power outages, which last from 2 to 6 hours. This severely degrades the town's quality of life and shuts down the local school.*

Schools

Due to power outages and money, many of the teachers do not come to work each day. As a result, the students are being held back this year in an attempt to help them catch up next year.

The company conducted a similar assessment in the town of Sharquat. The hospital needed some plumbing and carpentry work, and the school needed similar repairs. Task Force Rugged is working to hire someone to repair the plumbing in the hospital and school, and either Task Force Able engineers or contracted labor will perform the carpentry work.

Another key to helping Iraq is restoring the bridges damaged or destroyed through neglect and war. To enable one repair, an assessment was conducted with a representative from the U.S. Army Corps of Engineers Forward Engineer Support Team of the two damaged bridges in Bayji. These bridges will be repaired through contracted labor.

Limitations

Task Force Able engineers overcame several limitations as they executed Task Force Neighborhood:

Design

Since there were no box culverts available for the Zone A road crater project, we designed a culvert system with round culverts and sandbags as headwalls. The temporary fix should last long enough to allow the Iraqi government to reestablish itself and provide a more permanent solution. We also designed the causeway for the Tikrit Bridge using a geotextile. We constructed the causeway directly on the Tigris River using river rock, gravel, and sand. The geotextile allowed much better compaction of the aggregate.

Language

To overcome the language barrier, we used local community personnel or Task Force Iron Horse interpreters.

Cultural Differences

We adapted our work efforts to accommodate Iraqi culture differences. Since they do not work on Friday, we performed maintenance that day.

Resources

We negotiated the use of local rock quarries, labor, and equipment to overcome some of our resource shortfalls. The MCAP D7 dozer only clears UXO to a depth of 12 inches. Submunitions were found at 24 inches, so we used D9 dozers to overcome this limitation.

Force Protection

No project was started unless a thorough force protection plan was established and executed.

Conclusion

Operation Task Force Neighborhood is vital to the rebuilding of Iraq. Task Force Able engineers continue to assess infrastructure and hire local Iraqis to rebuild their country, while providing the coordination necessary to efficiently prioritize, resource, and manage the projects until the government is reestablished and this role can be turned over to the Iraqi people.

Colonel Vosler commanded the 555th Combat Engineer Group when this article was written. Previously, he served as the Executive Director of Military Programs at the U.S. Army Corps of Engineers headquarters in Washington, D.C. He also commanded the 35th Engineer Battalion at Fort Leonard Wood, Missouri.

Lieutenant Colonel Turner commands the 14th Engineer Battalion. He previously served as a brigade executive officer and S3 in the 1st Armored Division Engineer Brigade and battalion executive officer in the 40th Engineer Battalion.

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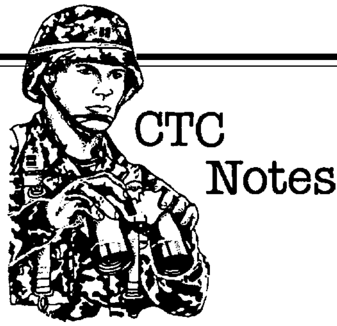

National Training Center (NTC)

Subterranean Complex Operations

By Sergeant First Class Josue A. Pinos

Subterranean complex (or cave) operations are part of the contemporary operational environment at NTC. These operations provide covered and concealed routes of movement throughout urban or mountainous terrain and replicate terrain condition challenges where our forces will fight.

A detailed knowledge of the nature and location of underground facilities is potentially of great importance to both the attacker and the defender. Maximizing the use of a subterranean complex could prove to be a decisive factor during urban or mountain operations. Units planning to conduct such operations should consider the following:

Tips for Success

- Use night-vision goggles with infrared (IR) sources.
- Use IR-filtered flashlights/white lights.
- Use field telephones and messengers.
- Use tag lines to guide soldiers along the route.
- Use shotguns or scatter-type munitions.
- Include caves on the modified combined obstacle overlay.
- Calculate demolitions needed for cave destruction.
- Integrate explosive ordnance disposal assets for search/destruction of caches of weapons of mass effect.
- Review Field Manual 3-06.11, *Combined Arms Operations in Urban Terrain*.

Cave Complex Tunnel

Common Mistakes

- Lack of experience in neutralizing booby traps and obstacles
- Poor/inadequate communications
- Poor route marking
- Failure to consider chemical hazards

Highlights of Rules of Engagement

- No booby traps and pyrotechnics are authorized except the M117 simulator.
- Units are authorized to use meals, ready to eat (MRE) bag grenades as simulators in place of M84 stun grenades and M67 and M69 fragmentation grenades.
- No smoke grenades or CS (tear gas) canisters will be used within 10 meters of the cave entrance.
- No ammunition is authorized inside the cave except 5.56-millimeter blanks.
- Weapons may not be fired within 5 meters of another soldier.
- Stoves or open flames are prohibited inside the cave complex.
- Vehicles are not permitted to drive over or park on top of the cave complex.
- Units assaulting or occupying the cave complex must receive a safety briefing from their observer-controller (OC).
- No live demolitions (to include demolition-effects simulators) will be used in the cave complex without obtaining a waiver through the commander of the operations group.
- Eye and ear protection are required.

There are three cave complexes at NTC that challenge units and provide a more realistic training environment.

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Antipersonnel Obstacle Breaching System (APOBS)

By Sergeant First Class Josue A. Pinos

The APOBS is now a system of choice of rotational engineer units at NTC. The APOBS, which is relatively new to conventional forces in the Army, was live-fired during NTC's Mine Awareness Training in March 2003. NTC continues to develop and improve mobility and countermobility tactics employed by combat engineers. This system provides commanders with another alternative to reduce antipersonnel obstacles. Opposing Force (OPFOR) TM-89 mines directly under the line charge will be destroyed also because of their seismically influenced fuse.

APOBS Launch

Characteristics, Capabilities, and Features

- Two-person portable
- Total weight of 123.5 pounds
- Clears a 2-meter by 45-meter path through antipersonnel mines and wire obstacles
- Provides a 35-meter standoff
- Operates in delay or command mode
- Can be fired in under 2 minutes in the delay mode
- Simple and rapid operation

Highlights of Rules of Engagement

- The APOBS team executes proper setup procedures.
- The APOBS team simulates pulling the pin and waits 15 seconds before firing the grapnel cartridge provided with the APOBS trainer.
- If a grapnel cartridge is not available, an OC fires a white star cluster to simulate the rocket launch.
- Eight seconds later the OC will detonate a grenade simulator to replicate the detonation of the line charge.
- The OC will administratively clear any antipersonnel mines, antitank mines, and wire, beginning 35 meters from the point of launch and providing a 2-meter by 45-meter footpath.
- The unit must clear any mines left in the path using appropriate proofing/reduction techniques.
- Unprotected personnel within the 75-meter surface danger zone of the line charge will be assessed as casualties.

NTC offers a great opportunity for employing the APOBS.

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Mine Effects Simulator (MES)

By Sergeant First Class William Sutton

Battlefield fidelity is a critical aspect of every training environment. However, mines and mine replication during training historically challenge trainers. Fortunately, a coordinated effort by NTC, several TRADOC schools, and the Program Executive Office for Simulation, Training, and Instrumentation is improving the situation for Army units. These efforts resulted in the acquisition of 4,750 Multiple Integrated Laser Engagement System (MILES)-compatible MES mines for use at NTC beginning in late summer 2003. The purpose of this new equipment is to increase battlefield realism and better simulate the real-world effects of popular foreign antitank mines. The TM-89 antitank mine is the primary one used at NTC and replicates typical training issues. Before the implementation of the MES mines, the only way to adjudicate a minefield was for an OC to overwatch the event. The verification and validation of this important system will be complete by spring and will likely lead to additional future procurements of the MES.

Description

The MES has a tan body with a blue ring on top. Designed with the dimensions of a Volcano mine, the MES contains the components necessary to electronically inflict simulated battle damage to combat vehicles. The mine can be used in a mine shell to simulate a conventional mine, or it can be used alone to simulate a scatterable mine. The MES simulates the effects of antitank mines by emitting a signal to vehicles equipped with a MILES II and an MES receiver antenna. The MES receiver antenna is already part of the current MILES II and uses a radio frequency signal from the mine to the antenna. This training mine operates using two common AA batteries that should last up to 6 months. Soldiers simply depress the TEST/ARM switch on the side of the MES to test and arm the "mine." The MES becomes active 2 minutes after the switch is depressed. To manually disarm the mine, simply execute the same action.

Mine Effects Simulator

Usage

The MES will be employed by the OPFOR to replicate the TM-89 antitank minefields. When used with the mine shell, it will replicate both the standard OPFOR conventional minefields and minefields emplaced by the mobile obstacle detachment.

Highlights of Rules of Engagement

The effects of the MES will be automatic and will minimize the need for OC adjudication. However, rules of engagement will—

- Assess the vehicle if it straddles or strikes the mine.
- Assess casualties for troops in the open within a radius of 25 meters of the detonating mine.
- Require a 1-pound block of explosive placed next to, but not touching, the mine to reduce it when conducting a manual reduction.

All other reduction technique rules of engagement remain unchanged.

Mine effects simulators will provide NTC with increased training realism and improved battlefield effects and will allow a more productive training environment.

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Joint Readiness Training Center (JRTC)

Engineer Equipment Platoon Leadership: Operating in Support of a Light Brigade Combat Team

By Sergeant First Class Steven J. SanPedro and Staff Sergeant Joey W. Dunn

A trend in recent rotations at the Joint Readiness Training Center is that the platoon leader (PL) and platoon sergeant (PSG) perform duties as the blade team leader (BTL). This trend has developed as the BTL consistently takes a back seat to either the PL or the PSG during the linkup, control, and execution of blade teams in support of maneuver units. A direct result is that there are shortcomings in preparing and executing the brigades' survivability effort. Either the PL or the PSG is becoming the main point of contact for the supported unit when previously it was the BTL. To the supported unit, the PL or PSG appears to be the BTL rather than the brigade-level survivability command and control element. Each of the platoon's key leaders has a very important role in the platoon's survivability mission in the planning, preparation, and execution phases of the platoon's operation.

PL Duties and Responsibilities

The PL has the primary responsibility for planning and executing the brigade's force protection efforts and ensuring that his survivability plan is integrated with the maneuver plan. This great responsibility requires the PL to be very proactive. During recent rotations, the PL has been leading a single blade team throughout the operation. The PL can—and sometimes should—provide command and control for the blade teams during execution. However, the PL must collocate with the brigade tactical operations center (TOC) during critical times in the planning process and return to the battlefield during the preparation and execution phases. The required product from the planning process is the survivability timeline. The PL should assist with and provide expert feedback on the platoon's capabilities and its ability to support the brigade commander's priorities of work, including the maintenance and rest plans. The PL works closely and maintains constant communications with the brigade engineer, assistant brigade engineer, and PSG to coordinate details for execution of missions such as providing fuel, maintenance, and security escorts.

During execution, the PL should battle track the survivability efforts and the overall common operational picture of the battlefield. He must ensure that every member of the platoon knows the status of the routes, obstacles, and friendly and enemy minefields and forces. A method that works well for tracking the survivability effort is for the BTL to send updated survivability status reports on the company net to the PL. Reporting on the company net allows the company command post in the brigade rear engineer cell (BREC) to receive the updates at the same time the PL is receiving them from the BTL. This gives the BREC the current status and reduces the amount of times the information is handled from the point of origin. The BREC can then forward the updates to the brigade main engineer cell (BMEC) at the brigade TOC.

As the PL observes the current tactical situation, he may need to reassess and update the survivability timeline in order to give the brigade engineer the most current estimate and updated timeline. Additionally, the PL is responsible for the overall standard of the survivability positions provided for the brigade task force. The PL should coordinate logistics with the PSG for important sustainment items such as vehicle parts, food, fuel, water, and ammunition. The PL ensures the quick identification, evacuation, and repair of all critical engineer equipment assets and should coordinate with supported units for security and movement escorts to and from jobsites. There are many similarities in duties between the equipment PL and the task force engineer. (The duties and responsibilities of the task force engineer are in FM 5-7-30, *Brigade Engineer and Engineer Company Combat Operations [Airborne, Air Assault, Light]*.)

PSG Duties and Responsibilities

The PSG plays a unique role in the survivability process. Not only does he have the numerous responsibilities of his own position, but he also must know and understand the PL's job and be able to step in without notice to execute those duties. The PSG should maintain the current tactical and logistical battlefield situation. He is the primary technical adviser to the PL and should provide expert advice on the platoon's capabilities during survivability planning. The PSG is the technical expert on operator proficiency and noncommissioned officer skills. In addition to focusing on the overall platoon effort, he should be available for technical advice to the BTLs when needed. Most importantly, the PSG must track the platoon logistically and supervise the requisitioning of its supplies. This involves a great deal of coordination and constant follow-up with the company and forward support battalion in order to be successful.

The PSG should control the collection of casualties and ensure that casualties are evacuated to the appropriate level. An easily overlooked part of this process is following up on the requisition for personnel to replace those that are lost and then focusing on the integration of the new personnel as replacements are received. The PSG must take the lead in enforcing the platoon's maintenance program, ensuring that parts are getting ordered, and tracking the document numbers until the parts arrive. Once the parts are on hand, the PSG must either get the parts to the vehicles or get the vehicles evacuated back to the maintenance area for repair. The PSG should receive and distribute the platoon's load of food, water, ammunition, and fuel. Most of these items will be provided by the supported units through daily logistics packages. However, if the supported unit does not adequately provide the items, the PSG must step in and make sure the platoon gets the supplies it needs to function.

BTL Duties and Responsibilities

The BTL is the direct link between the platoon and the supported unit and must conduct linkups with the "CINC" dozer or other designated unit representative. For initial linkup procedures, the BTL must have a battle drill that is easily understood and executed by the blade team once it arrives on site. Much of the idle time on the battlefield can be attributed to the time waiting at a unit while the BTL is conducting linkup. Once on site, the blade operators must know what they are digging in and know that no matter what happens, they can get started on high-priority survivability efforts for that unit. During the linkup process, the BTL must coordinate for fuel, food, water, or any other support needed from the supported unit. After the linkup, the BTL should know the unit representative, the survivability requirements for the unit, when and where refueling will take place, and the location of all logistical support. Additionally, the BTL should confirm the unit's mission, the current enemy threat, the number of assets, and the terrain within the unit's area of operations in order to provide survivability recommendations based on the ability of the blade team to provide a sound survivability position. The BTL must adhere to the survivability timeline, to include the implementation and management of the maintenance and rest plans. Furthermore, the BTL should forward an updated status of the survivability effort at the position and coordinate early for the linkup, movement, and preparation of the next unit he will be supporting.

Summary

Each of the key leaders—the PL, the PSG, and the BTL—has an important role in planning, preparing, and executing the survivability plan. Proper understanding and implementation of these roles will provide the best opportunity for a successful plan. A good survivability timeline—with emphasis on the survivability standards—will leave every brigade asset on the battlefield with a doctrinally proven survivability position.

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Combat Maneuver Training Center (CMTC)

NCO Roles and Responsibilities in C2 Nodes

By Sergeant First Class Danny Petersen

The overarching role of staff noncommissioned officers (NCOs) is to free up staff officers and enable them to make critical decisions in a timely manner. Given that, people often assume that the primary function of NCOs in command and control (C2) nodes is to ensure that the generator is fueled and that the shift change occurs on time. Nothing could be farther from the truth or more harmful for efficient operations.

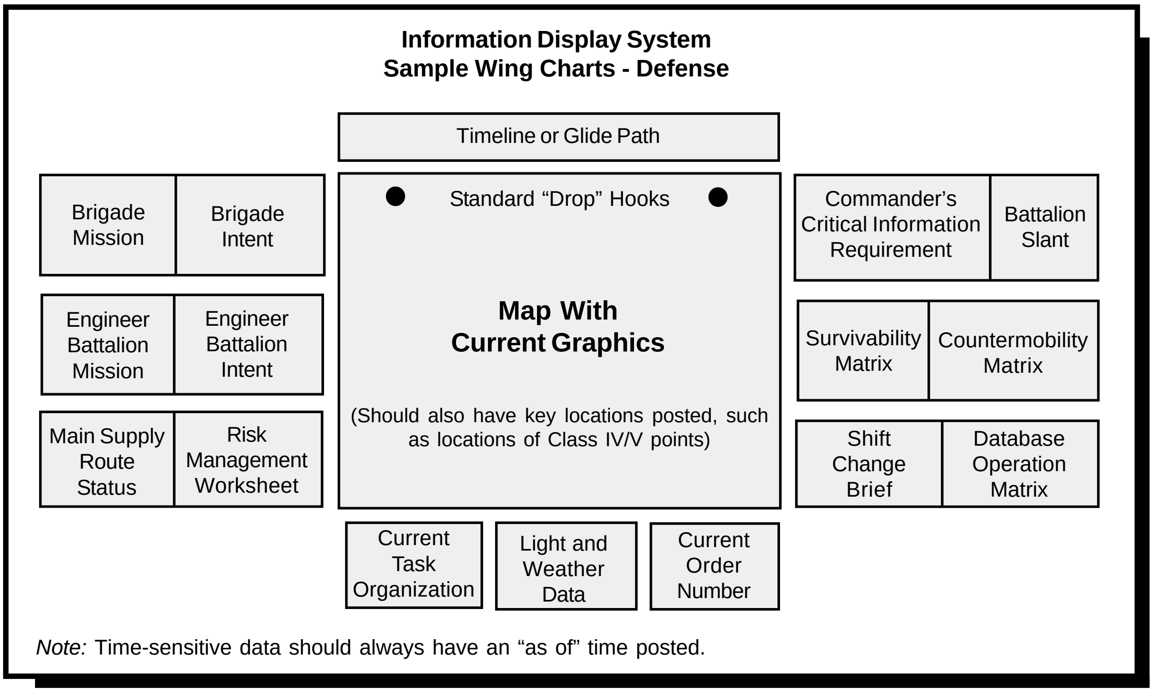
To help NCOs better understand their roles and responsibilities, they can refer to many doctrinal references; tactics, techniques, and procedures; and combat training center lessons learned. The most common doctrinal publication used to establish individual roles and responsibilities in the heavy engineer battalion tactical operations center (TOC) is Field Manual (FM) 5-71-3, *Brigade Engineer Combat Operations (Armored)*. Although Chapter 2, "Command and Control," does not spell out the specific responsibilities for the operations sergeant and battle staff NCOs, there are numerous implied tasks. Additional publications, such as the Center for Army Lessons Learned (CALL) Newsletter titled "Tactical

Operations Center" (No. 95-7, May 1995) and an engineer-specific CALL Newsletter addressing TOC operations (No. 99-12, October 1999), are helpful as well. Although these two references are an average of six years old, they provide a basic framework for TOC NCOs that is still applicable today. The following discussion applies mostly to units operating in an analog manner, although the main principles apply even when a unit becomes digital.

Typically, the operations sergeant and his shift NCOs have the background and experience to understand the six TOC functions—receive information, analyze information, submit recommendations, distribute information, integrate resources, and synchronize resources—from FM 3-90.3, *The Mounted Brigade Combat Team*, Chapter 3. TOC NCOs who know what information is important and how that information affects the mission become a real combat multiplier in the TOC. These NCOs are usually former platoon sergeants or squad leaders who understand how decisions made at the TOC affect the "guy on the ground." In contrast, the battle captains assigned to the TOC may be young lieutenants awaiting platoon leader duties, more experienced lieutenants awaiting the Captain's Career Course, or more experienced captains either awaiting company command or having recently completed command and pending a permanent change of station (PCS). The differing levels of experience may be vast. By providing both experience and continuity, TOC NCOs bring significant value to the fight—experience that manifests itself as a smoothly operating and functional TOC. At times, NCOs may feel that TOC operations are officer business, given the extensive use of computer programs such as TerraBase and Command and Control for Personal Computers (C2PC). However, the bottom line is that the operations staff will succeed or fail as a *team* of officers and NCOs and, in the process, will either enable the commander or relegate him to insignificance, based on the level of situational awareness the TOC maintains. The table below depicts actions NCOs can execute to facilitate the six command post functions. Although not all-inclusive, the table provides useful examples that can serve as a foundation for developing a unit TOC standard operating procedure (TOCSOP).

Command Post Functions and NCO Actions

Function	Actions
Receive Information	■ Monitor reports as received by the radio/telephone operator (RTO). ■ Ensure that the RTO records reports and maintains log. ■ Update unit/key leader locations on map when received. ■ Update combat power slants according to the unit tactical SOP (TACSOP), when required.
Analyze Information	■ Monitor key equipment losses (which may lead to a task-organization change). ■ Monitor information pertaining to the commander's critical information requirement (CCIR). ■ Update overlays and charts, as necessary, to maintain situational awareness. ■ Compare engineer TOC overlays with those of the brigade; if discrepancies exist, determine the cause and remedy. ■ Monitor proposed timelines and glide paths; compare these to subordinate-unit activity reports, and look for discrepancies.
Submit Recommendations	■ Provide insight on NCO issues and how proposed plans affect subordinate units. ■ Provide recommendations based on experience for time requirements (such as movement and execution of mine-clearing line charge [MICLIC] reloads and armored combat earthmover [ACE] dig rates).
Distribute Information	■ Inform the brigade of any changes to the combat power slant. ■ Brief all key personnel according to shift-change brief and schedule. ■ Use the system to file and maintain orders and reports. ■ Assist in orders production and publication. ■ Use the system to display information for key leaders (example provided in the chart on page 51).
Integrate Resources	■ Compare engineer overlays with other Battlefield Operating System overlays (such as combat service support and fire support [FS]) to ensure cursory integration; look for disconnects. ■ Monitor unit linkups for all task-organization changes; post when complete.
Synchronize Resources	■ Compare engineer timeline with brigade and subordinate-unit timelines; look for disconnects.



The chart above depicts an information display system that a battalion operations sergeant can easily establish. Staff officers, more often than not, fall in on existing systems and use what is available until they can make their own assessments about what information is needed. If a comprehensive and user-friendly system is in place and used by the NCOs, staff officers will experience a seamless transition and will develop more efficient TOC operations.

Further, how TOC NCOs execute and improve the information management and display system may be as crucial as the system itself. The attitude of "this is how we've always done it" may quickly turn people off in their attempts to improve the system. TOC systems must constantly be analyzed, and improved when and where necessary, while being integrated into the unit's TACSOP and TOCSOP. The TOC NCO should listen to other staff members and use their ideas to help improve products and mechanisms. Remember that people making suggestions are on the same staff and use these same systems, so they also have a vested interest in efficient operations. However, the engineer battalion operations sergeant should not just look internally to his staff. He must be familiar with the supported maneuver brigade TACSOP and ensure that the engineer battalion and maneuver brigade TACSOP complement each other. This is most critical in terms of reports and combat power tracking. Having complementary TACSOPs will generally yield more accurate information and improve information flow. When information tracking and management systems are not synchronized with the supported maneuver brigade, they generally will not work well for the engineer battalion and will likely cause redundant information management systems to satisfy brigade- and higher-level information requirements.

NCOs must also understand the roles of the staff officers they work with in the TOC. By understanding staff officer roles and relying on their own experience, TOC NCOs are more readily available to help with planning operations, providing intervention before problems escalate, gathering required information, and assisting an officer's transition to battle captain.

NCOs who are charged with TOC responsibilities, and who are proactive and research the previously referenced publications, communicate a positive intent to the chain of command that they want to be combat multipliers in the staff. For such NCOs, the chain of command should immediately begin the process of getting them to the Battle Staff NCO Course (BSNCOC), which is the only course that strictly places NCOs in all staff positions from division to task force level. This shows NCOs how all the pieces fit together and how they can directly affect every facet of the operation. Further, the BSNCOC teaches NCOs the skills that are necessary to develop and maintain efficient TOC systems. Educated and enthusiastic staff NCOs who understand their role in the TOC provide significant value to the team. Instead of just "doing their time," staff NCOs will likely find working in the TOC a very rewarding and eye-opening experience.

Sergeant First Class Petersen is the engineer battle staff NCO observer-controller at the CMTC. His previous assignments include assault section sergeant/combat engineer vehicle commander, 82d Engineer Battalion, Germany, and Assault and Obstacle Platoon sergeant/operations sergeant in the 58th Engineer Company, 11th Armored Cavalry Regiment (OPFOR), Fort Irwin, California.

Prime-Power Considerations for Engineer Planners

By Captain Geoff Van Epps

Recent experiences in Iraq, Afghanistan, East Timor, and other global hot spots have shown that most theater or Joint Task Force-level engineer staffs are largely unfamiliar with the capabilities, limitations, and employment of prime-power assets. Because the 249th Engineer Battalion (Prime Power) is the only unit of its kind in the Army, staff planners simply lack exposure to the unit and training in the employment of its assets. Furthermore, the current doctrinal guidance in Field Manual (FM) 5-422, *Engineer Prime-Power Operations*, frequently comes up short in bridging the gap between theory and practice because the manual was written before prime power was reorganized into the 249th Engineer Battalion in 1994. (FM 5-422 is being revised and will be published as FM 3-34.483, *Engineer Prime-Power Operations*.)

The following four lessons have proven to be the most important and most repeated comments over the course of the past two years of operations.

"All Things Electrical"

Often, engineer planners pigeonhole prime-power soldiers into one or two specific missions rather than capitalizing on the full range of their capabilities. In fact, the prime-power production specialist (military occupational specialty [MOS] 52E [21P as of October 2003]) is the most versatile and best educated of the "green-suit" electrical specialties in the Department of Defense. Having completed an academically rigorous 50-week course and several technically challenging missions each year since entering the field, each prime-power soldier is capable of expertly accomplishing virtually any electrical mission, including technical assessments and design of power systems; installation, operation, and maintenance of power plants and distribution systems; maintenance and repair of circuit breakers and protective relays; and quality assurance on electrical contractors.

Recent missions which have showcased the versatility of prime-power soldiers include—

- Civil reconstruction efforts in Iraq.
- Installation and operation of four power plants in the Afghanistan theater.
- Base camp planning and design in Iraq.
- Technical reconnaissance of dozens of potential bases in Turkey.
- Construction of an overhead electrical-distribution system at Baghram Airfield.

Power plant installed in Kyrgyzstan

A prime-power soldier works in the snow to keep the power on.

- Electrical assessments in the Philippines.
- Maintenance of the backup power plant at Incirlik Air Base, Turkey.
- Acting as the contracting officer's technical representative on U.S. Army Corps of Engineers (USACE) power contracts.

Engineer planners who recognize the full spectrum of prime power's capabilities and use prime power accordingly will not only improve the quality of support that engineers can provide but will concurrently realize great time and cost savings.

Long Logistical Tail

In general, prime-power units lack the capability to self-sustain below the company level. Since the prime-power platoon is the basic building block in terms of capability (and the company headquarters' current deployment to Baghdad is its first for any operation since prime power was reorganized as a battalion in 1994), this means that most often, deployed prime-power units will need administrative, supply, maintenance, and other support.

The prime-power platoon will require help in ordering and receiving parts and supplies since it has neither an organic supply noncommissioned officer nor a parts clerk. Lacking any mechanics other than for its generators, the platoon requires assistance with wheeled-vehicle and engineer equipment maintenance. With no personnel section, it needs support in processing finance and administrative actions. Finally, a prime-power platoon will require engineer support for excavation or trenching for installation of a distribution system.

If the company headquarters were to deploy (for instance, if two or more platoons simultaneously deployed to the same area), it would bring some of the support capability that the platoon lacks. However, prime power would still lack vehicle maintenance capability and the ability to provide its own dig support.

Although doctrine in this area is fuzzy at best, recent lessons learned have shown that an individual platoon is best tied in with a colocated engineer battalion (combat)(heavy) or a similarly organized construction task force. The company headquarters, being a theater asset, would report directly to the senior engineer unit, whether an engineer command, an engineer brigade (theater Army), or another engineer unit proportional in size to the theater headquarters. In cases where there is no local engineer headquarters of sufficient size, the best command-support relationship is to keep prime power attached to the nearest large engineer headquarters but make the platoon in general support of the local command. While the actual task organization will vary from mission to mission, the rule of thumb is to control prime-power assets at the highest level possible, since their capabilities will be required theaterwide and the soldiers will end up literally all over the battlefield conducting assessments, providing design expertise, offering technical assistance, and executing other missions.

Managing Expectations

Deploying prime power to support base camp development can be expensive, complex, and time-consuming, but it still offers the most responsive, efficient, and cost-effective means of providing reliable, utility-grade power to large military facilities during contingency operations. The timeline for procuring the bill of materials (BOM) required to construct an electrical-distribution system can be quite lengthy, since most industry has converted to

Two prime-power soldiers repair an Iraqi generator.

lean manufacturing techniques and small inventories, meaning that most materials are built to order. This can result in delivery schedules of 60 days or longer for materials. However, the procurement timeline for BOM can be significantly shortened by involving prime power in planning early, by anticipating mission requirements, and by using an "off-the-shelf" USACE IAP Worldwide Services Power Contract to streamline the contracting process.

As the 249th Engineer Battalion continues its force modernization process through fiscal year 2004, more platoons will be outfitted with the Deployable Power-Generation and Distribution System, which includes a great deal of "plug-and-play" materials that are compatible with Force Provider and the Air Force's Harvest Eagle/Harvest Falcon bare-base packages. Also, a good portion of the BOM for a base camp electrical system can be found in the Prime-Power Connection Kit, which is available with many Force Provider sets.

The BOM required for most prime-power missions, especially for nonstandard base camp construction, can be expensive, often resulting in initial sticker shock for the customer. For example, the material procurement cost for the 10,000-soldier base camp at Balad Airfield in Iraq was less than $10 million, but that cost will continue to grow (along with all other construction costs) as the standard of living in the theater improves. The high material cost is inherent in the significantly higher level of service and greater reliability afforded by prime-power over unit tactical generators. Engineer staff officers should anticipate the high cost and prepare the customer early to help mitigate sticker shock and manage expectations.

Another customer expectation that needs to be carefully managed is the time required to install a power plant and construct an electrical-distribution system. Once the power plant and associated equipment have been moved to their desired location (often a Herculean effort in itself due to the size and weight of the equipment, special material-handling requirements, and other factors), setting up the plant and delivering electricity to the customer is not an overnight process. Often customers perceive that once the generators are on the ground, prime-power engineers simply and quickly runs a big extension cord to all of the facilities on a base camp. On the contrary, the process of installing a grounding grid, switchgear, miles of cable, and dozens of transformers is a time- and labor-intensive process that requires clear guidance from the customer and prioritization to ensure that the most critical loads are serviced first.

Early In, Early Out

With only eight power-generation platoons on active duty and two more in the Reserve Component (see article on page 55), the 249th Engineer Battalion (Prime Power) is extremely small to be shouldering the U.S. Army's entire prime-power mission. Executing multiple rotations to support combat operations while honoring standing commitments in Korea, Hawaii, and Europe has proven to be a delicate balancing act. In September 2002, the battalion's soldiers were simultaneously engaging in missions in the combat zones of Operation Enduring Freedom, preparing for combat operations in Operation Iraqi Freedom, and conducting disaster relief in Guam, which stretched the unit's members to the breaking point. Consequently, prime power has evolved into an early-entry, contingency solution for filling military power requirements, with each deploying platoon capable of installing and operating a power plant, constructing an electrical-distribution system, and providing technical assistance and planning to fill follow-on power needs.

Power during the first 30 to 90 days of an operation should be provided by unit tactical generators. Prime power provides a transition from 30 to 180 days into an operation and would ideally be relieved by either commercial or contract power. Sources for contracted follow-on power include the Logistics Civil Augmentation Program, Air Force Contract Augmentation Program, (Navy) Emergency Construction Capabilities Contract, and the USACE IAP Worldwide Services Power Contract. Whatever the source, planning for follow-on power should begin early—ideally as soon as the requirement for prime power is identified—to allow for detailed planning and mobilization and the smoothest possible transition from prime power to its successor.

Captain Van Epps commands Bravo Company, 249th Engineer Battalion (Prime Power), Fort Bragg, North Carolina. His previous assignments include service with the 52d Engineer Battalion (Combat)(Heavy) and the 27th Engineer Battalion (Combat)(Airborne).

Live from Baghdad: It's Prime Power

By Staff Sergeant Robert Stephenson

It is probably the smallest unit currently mobilizing through Fort Dix, New Jersey, and yet its specialty makes it indispensable to the military. Alpha Company, 6th Platoon, 249th Engineer Battalion (Prime Power), is an elite unit of nine reservists from Attleboro, Massachusetts, that works on high-tension power lines and is responsible for making sure that all power keeps flowing through the system uninterrupted. Just as the Signal Corps is the Ma Bell of the military, the prime-power unit can be considered the ConEdison of the military. The fact that there are so few soldiers who are able to work on high-tension power lines means that the well-traveled unit works all over the United States and overseas on a regular basis.

Normally on active duty about two or three months out of the year, the unit is brought in for Federal Emergency Management Agency missions, disaster relief, and power assessments—in addition to its regular training missions. The unit also receives orders from the U.S. Army Corps of Engineers for active duty special work. As power-distribution experts, the unit is the only one authorized to work on "energized" or live power lines. This means that its soldiers can make repairs while up to 30,000 volts of electricity surge through the lines. About 80 percent of the unit members are civilian power line workers. Although the Army does provide a 2-month school for power distribution and a 1-year school for power generation, having civilian experience gives soldiers the needed expertise to be able to handle live wires.

Having such a specialized unit in the Army has its distinct advantages. When the unit goes places, literally millions of dollars are saved. Working live is important in missions where power must run continuously during the repair process, such as at military airports. Besides the cost savings, another advantage of using the prime-power unit over civilian contractors is that its soldiers already have all the clearances necessary to work in secure areas.

Soldiers from Bravo Company, 6th Platoon, 249th Engineer Battalion, erect a pole as they repair the high-voltage electrical system at Baghdad International Airport.

The crew sets a pole near the CJTF-180 building at Baghram Air Base, Afghanistan. A total of 130 45-foot concrete poles were set there by the 249th Engineer Battalion.

In September, Alpha Company replaced its sister unit (Bravo Company) in Iraq, where it is helping rebuild the infrastructure of major cities such as Baghdad. Among other missions, Bravo Company's power-distribution unit completed work on power lines that had been attached to a bridge destroyed during the conflict in Iraq. Those power lines carried electricity to one of Saddam Hussein's palaces, which is currently being used as a U.S. military headquarters.

As might be expected, the soldiers in the unit who work for municipal and local power companies take a pay cut when deployed, but that doesn't seem to faze them. They believe that what they do is important and that they contribute a valuable service to their country.

Staff Sergeant Stephenson, a New Jersey National Guard soldier, is currently mobilized with his public affairs unit at Fort Dix, New Jersey, in support of Operation Enduring Freedom, where he serves as the NCOIC of the broadcast section. When not deployed, Staff Sergeant Stephenson works full time as the Public Affairs NCOIC for the New Jersey National Guard Counterdrug Task Force.

Note: There are no active duty transmission and distribution specialists (MOS 52G [21Q as of October 2003]); they are all members of the Army Reserves. The 21 MOS 52Gs stationed in Attleboro, Massachusetts, are divided into Alpha and Bravo Companies, 6th Platoon. Both are part of the 249th Engineer Battalion, which is headquartered at Fort Belvoir, Virginia.

Photos by CW2 Donald McRae

Enlisted PERSCOM Notes

By Lieutenant Colonel Jack F. Smith

Greetings from your Engineer Enlisted Branch at PERSCOM. Since I will soon be leaving to become the Combat Support Division Chief, the next PERSCOM notes will come from Lieutenant Colonel Margaret Burcham, who is moving here from Germany. It has truly been a great experience to work with the Engineer Branch team and serve the soldiers of the Corps of Engineers. While I am moving into a new position, I'll still have responsibility over the engineer community, as well as the Military Police, Military Intelligence, Transportation, Aviation, and Signal Corps. So if you have enlisted issues that you think I can help with, let me know.

Health of the Regiment

The Engineer Regiment is well manned across the Army (see Table 1). While we have some small shortages in military occupational specialties (MOSs) 12Z, 51Z, and 81Z, 17 of the other engineer MOSs are above 100 percent. Our biggest challenge continues to be MOS 12B, which is enrolled in the Army's top ten critically short MOSs. Over the past four months, more than 1,000 new soldiers graduated from advanced individual training and reported to units in the field, which has decreased our shortage of skill level one sappers throughout the force. We fully expect the MOS to be healthy by the beginning of fiscal year (FY) 04. Most units also have 12B20 shortages. The primary reason for this shortage of sergeants is due to the number of sergeants on recruiting duty (about three mechanized battalions' worth of sergeant E5s). Over the next year, we will gradually decrease that number to get our manning in troop units back to a manageable level.

We do still have significant challenges in MOSs 51M and 00B at the noncommissioned officer (NCO) rank that simply will not go away until the units do their job to get soldiers prepped and to their respective promotion boards. I've repeated this story several times, but I will not let it go as long as the NCO shortages continue in these critical engineer MOSs and anyone asks my opinion.

Recruiting and retention have been well above historical averages across the Army and in the Engineer Regiment. Our FY03 recruiting program is all but sold out for FY03, and we have sold the majority of the first quarter FY04 seats. On the reenlistment side, all but 3 of our 21 specialties are well above the five-year historical trend. Current trends indicate that this success rate will continue. However, our reenlistment rates for MOSs 12Z, 51Z, and 81Z have been well below the historical average. Apparently, senior NCOs are making a lot of significant career decisions.

As of the publication of this article, there should be no engineer MOSs under the stop-loss program, which allows the Army to retain soldiers with critical skills on active duty beyond their separation date. Soldiers currently serving under stop-loss conditions will be allowed to depart the Army during the October-December 2003 timeframe. For those of you who were impacted by the Stop-Loss Program, I want to express to you my gratitude for the sacrifices you have personally made to serve our country. You all are simply great Americans.

MOS	Authorized Strength	Strength (percent)
12B	8,182	99
12C	672	103
12Z	264	94
00B	129	112
51B	882	118
51H	446	104
51K	116	103
51M	248	105
51R	128	148
51T	256	121
51Z	132	94
52E	184	107
62E	1,323	105
62F	277	101
62H	103	99
62J	664	106
62N	469	101
81L	232	102
81T	470	109
81Z	23	96
82D	110	109
Total	15,310	102.6

Table 1. Engineer Enlisted Operational Strengths (as of 30 May 2003)

Engineer MOS Conversion

Effective October 2003, all of the engineer MOSs are being redesignated to a 21-series nomenclature as part of the Army's MOS conversion program. Table 2 lists the deleted engineer MOSs, the new 21-series nomenclature, and the Professional Development NCO (PDNCO) here at PERSCOM who manages the respective MOSs.

These changes will be hard. MOSs 12B, 51B, 62E, and 81L hold special meanings to us old soldiers, and many of us will struggle to remember exactly what a 21S or a 21V is. On the other hand, changes such as these will provide some great benefits to our Regiment. There are few in the Army who know what an MOS 00B is or that it is a critical engineer MOS. With the designation 21D, it will be easy to discern that it is an engineer MOS.

Although some MOSs in the Army that are being merged and/or realigned will impact career progressions, NCO development, and the like, this is not the case for engineers. All of our MOSs simply change designations, with no impact on career progression, MOS training, or promotion opportunities.

Old	New	MOS	PDNCO
21A	21A	Engineer Officer	MSG Boyce
12B	21B	Combat Engineer	MSG Boyce
12C	21C	Bridge Crewmember	MSG Boyce
00B	21D	Engineer Diver	MSG Williamson
62E	21E	Heavy Construction Equipment Operator	MSG Williamson
62F	21F	Crane Operator	MSG Williamson
62G	21G	Quarrying Specialist (Reserve Component)	MSG Williamson
51H	21H	Construction Engineering Supervisor	MSG Williamson
62J	21J	General Construction Equipment Operator	MSG Williamson
51K	21K	Plumber	MSG Williamson
81L	21L	Lithographer	SFC Banco
51M	21M	Fire Protection Specialist	MSG Williamson
62N	21N	Construction Equipment Specialist	MSG Williamson
52E	21P	Prime Power Production Specialist	MSG Williamson
52G	21Q	Transmission and Distribution Specialist	MSG Williamson
51R	21R	Interior Electrician	MSG Williamson
82D	21S	Geodetic Surveyor	SFC Banco
51T	21T	Technical Engineer Specialist	MSG Williamson
81T	21U	Topographic Analyst	SFC Banco
62H	21V	Concrete and Asphalt Equipment Operator	MSG Williamson
51B	21W	Carpentry and Masonry Specialist	MSG Williamson
51Z	21X	General Engineering Supervisor	MSG Williamson
81Z	21Z	Topographic Engineering Supervisor	SFC Banco
12Z	21Z	Combat Engineering Senior Sergeant	MSG Boyce

Table 2. Engineer MOS Conversions

Assignments

A large portion of our active Army is fully committed in units around the world: three-plus divisions in the Middle East, a brigade-plus in Afghanistan, a brigade-plus in the Balkans, a division in Europe, and a division in Korea. This situation leaves only a very small pool of soldiers to rotate through critical assignments both stateside and overseas. We will be placing soldiers on assignment with even less than two years time on station to meet pressing Army readiness needs—and with as little as two months notification. As an institution, we don't like to do this to our soldiers, but those are the circumstances we now face in order to meet the needs of the Army. As the situation stabilizes and our soldiers redeploy, we will be able to return to many of the stabilization and assignment policies that were in place before the global war on terrorism, but it will take us some time to get there.

The assignments will come, so be ready. I'll use this opportunity to put in another plug for the Assignment Satisfaction Key (ASK) program that can be found on the Army Knowledge Online Web site <*http://www.army.mil/ako/*> and the PERSCOM Web site <*http://www.perscom.army.net*>. You should go there and update your volunteer and assignment preference data. Even with our current needs to place soldiers in Korea and other places, the first thing we still look at as we look for candidates is the ASK data.

For soldiers deployed overseas, I'm sure you're wondering if you'll be placed on orders as soon as your unit returns to the continental United States (CONUS). The answer is that many of you may well be placed on orders. We are reducing strengths of units in our institutional Army to continue to send replacements overseas. Our intent is to backfill these shortages in our training base, drill sergeant program, recruiting, Active Component/Reserve Component, and other areas with soldiers who return from deployment. You'll be given at least 90 days to stabilize after your deployment, but then many of you will be sent somewhere in CONUS. Obviously, it is very important that you update your ASK data.

Promotions and Training

With all of the unit and individual deployments around the globe, we do have a significant number of soldiers who have either deferred or were pulled out of the NCO Education System. Whether it was the Primary Leader Development Course, Basic Noncommissioned Officers Course, or Advanced Noncommissioned Officers Course, these soldiers will be rescheduled for schooling as soon as their deployment and stabilization allows. Many of these schools will be a temporary duty assignment while en route to new locations.

For information on pending selection boards, visit the PERSCOM Web site. It's up to you to review your Official Military Personnel File. You can obtain a copy by following the procedures posted at the Web site.

Contacting Us

The sole function of the Engineer Enlisted Branch at PERSCOM is to support soldiers and commanders in the field. I encourage you to contact your assignment manager, PDNCO, Branch sergeant major, me, or Lieutenant Colonel Burcham with any questions you have about assignments or professional development. The PERSCOM Web site has information on how to reach us. Remember, the only thing in the assignment process that does not have to be a variable is your preference. Take the time to let us know your preference.

Lieutenant Colonel Smith has been the chief of the Engineer Enlisted Branch for the past year. He previously commanded the 44th Engineer Battalion in Korea and prior to that was a war plans analyst at the U.S. Strategic Command, Offutt Air Force Base, Nebraska. Lieutenant Colonel Smith holds a master's in nuclear engineering from Penn State, a master's in military science from the Advanced School of Military Studies, and a master's in strategic studies from the Army War College.

Regimental Awards - Reserve Component

Each year we recognize the best noncommissioned officer, lieutenant, and engineer company, in each of the components, for outstanding contributions and service to our Regiment and Army. Every engineer unit in the Regiment can submit the name and achievements of its best of the best to compete in these distinguished award competitions. Only the finest engineer soldiers are selected as recipients of these awards. They will carry throughout their careers the distinction and recognition of being the Engineer Branch's best and brightest soldiers and leaders. The results of the 2002 Active Component Itschner and Grizzly Awards and Sturgis Medal selection boards were listed in *Engineer,* April-June 2003, page 26. The selections for the Reserve Component are as follows:

The Itschner Award committee selection for the U.S. Army Reserve: Headquarters Support Company, 463d Engineer Battalion (Combat)(Heavy), Wheeling, West Virginia, and for the Army National Guard: Alpha Company 1088th Engineer Battalion, 256th Infantry Brigade, Opelousas, Louisiana.

The Grizzly Award Committee selection for the U.S. Army Reserve: First Lieutenant Mark Dibble, 652d Engineer Company (Multirole Bridge), Ellsworth, Wisconsin, and for the Army National Guard: First Lieutenant John G. St. Romain, Bravo Company, 1088th Engineer Battalion, 256th Infantry Brigade, New Roads, Louisiana.

The Sturgis Medal committee selection for the U.S. Army Reserve: Sergeant First Class Lawrence Spradley, Headquarters Support Company, 854th Engineer Battalion (Combat)(Heavy), Kingston, New York.

All of the nominees represented their major commands with the highest professionalism and dedication to the Engineer Corps's vision and deserve our highest praise. The award recipients will be recognized at the U. S. Army Corps of Engineers Ball, tentatively scheduled for 17 October 2003.

For many years, senior leaders of the Regiment have debated about an appropriate award to recognize the very best engineer soldier, private through specialist. In keeping with the tradition of naming such an award after a distinguished member of the Regiment, the Regimental Command Sergeant Major, along with other senior sergeants major, recommended and gained approval for an award named after the most distinguished command sergeant major in the history of our Regiment—the fourth Sergeant Major of the Army, Leon Van Autreve.

The award is significant for two reasons: first, it was created to recognize the most outstanding junior enlisted soldier of the three components of our Regiment as a tribute to one of our Army's greatest champions of welfare and care of soldiers and their families; second, it showcases and highlights the important and significant service our junior enlisted soldiers provide to our nation. They are truly our most valued resource, and we wouldn't be the Army or Regiment that we are without their selfless and dedicated service. The Van Autreve nominations will be submitted for FY03 and presented at ENFORCE 04.

Lieutenant General Robert B. Flowers
Chief of Engineers

Major General R.L. Van Antwerp
Commandant, U.S. Army Engineer School

Engineers Battle Sulfur Fire

By Mr. Thomas O'Hara

This was not in their battle plan. They had no training for this. But American soldiers and Army engineers answered the call to fight a toxic sulfur fire creating a boiling lava-like melt that crept toward the Tigris River and threatened the water supply in southern Mosul, Iraq.

Wearing chemical masks to protect their lungs from nauseous sulfur fumes, members of the composite task force "Camp Sulfur" quickly stemmed the advance of the fire while working four-hour stints in the hot desert terrain. Choking off the caches of sulfur that constantly refueled the inferno, Army engineers turned the tide of flames and gradually smothered the threat to nearby citizens of Mosul. Members of the 326th Engineer Battalion, 52d Engineer Battalion, 926th Engineer Group, and 887th Engineer Company cooperated in the effort.

Aerial view of sulfur fires north of Mosul

While American forces accomplished this effort without injury or loss of life, the fire took its toll on an Iraqi fireman who was killed during the effort. Apparently thrown from a fire truck in the haste to quell the flames, the man landed in the lava-like pool and quickly burned to death. A countryman, trying to save his friend, was severely burned and evacuated for medical assistance.

The 326th Engineer Battalion officer in charge of fire fighting (left) discusses sulfur fires with soldiers.

Investigations were underway to determine if the fire was deliberately set as an act of vandalism or sabotage. Nonetheless, the response of Army engineers, in partnership with local Iraqis, prevented this environmental hazard from becoming a catastrophe.

Mr. O'Hara is a public affairs specialist and electrical engineer with the Omaha District, U.S. Army Corps of Engineers.

Photos by Jonas Jordan

Motorcycle Rider Risk Management

By Mr. Fred E. Fanning

Can risk management be the solution to everything? Maybe not, but it can go a long way toward preventing fatal motorcycle accidents. The Motorcycle Safety Foundation (MSF) has done a great deal of work to develop training programs to provide riders with the skills necessary to prevent motorcycle accidents. Riding a motorcycle can be a very dangerous sport or activity. However, by training properly and applying risk management, riders can help prevent crashes. The Army uses the MSF curriculum for motorcycle rider training as the standard.

History

In the 25 April 2003 issue of *USA Today*, Jayne O'Donnell reported that motorcycle fatalities were up in 2002 for the fifth straight year.[1] She indicated that this was a 3 percent increase. Ms. O'Donnell obtained her information from the National Highway Traffic Safety Administration, which has two very interesting reports on this subject on its Web site at *<http://www.nhtsa.dot.gov/>*.

In an article in the April 2003 *Countermeasure* publication, Master Sergeant Dave Hembroff raised the issue of motorcycle riders' risk of being involved in an accident.[2] He indicated that a rider who had not taken a rider training course was nine times more likely to be involved in an injury accident. Through February of 2003, Army personnel had 18 motorcycle accidents for the fiscal year. Six soldiers died in those accidents.

Conducting Risk Management

Accidents are normally the result of a series of events or factors that lead up to the accident. By controlling or eliminating some of those factors, the risk of being involved in a motorcycle accident can be greatly reduced. This is the process outlined in Field Manual 100-14, *Risk Management*, that we use for military operations and should use for all aspects of our lives. There are three primary areas that should be addressed in conducting risk management for motorcycle riding: rider factors, motorcycle factors, and road and traffic factors. See Table 1 for additional information. Each of these areas contains a number of factors that determine a rider's risk of being involved in an accident.

Rider

Riders should always be prepared to ride the motorcycle. That may sound a little strange, yet it is true. The rider of a motorcycle must focus his or her attention on the task of riding the motorcycle as well as the actions of other drivers, wildlife, and the condition of the road—all at once. This is far more focus than any automobile driver puts into the task of driving.

The amount of time riders have on their motorcycles has a great impact on the potential for an accident. The more you ride, the better rider you become. As service members or Department of the Army civilian employees, motorcycle riders are required to complete a course that is offered at most installations and provides basic information about riding. But don't let this be the only course you take. The more training

Type	Factors
Rider	Experience, training, protective clothing and equipment, consumption of alcohol and drugs, and lack of sleep
Motorcycle	Size, fit, and working condition
Road and Traffic	Road and highway conditions

Table 1. Factors to Consider in Risk Management

you get, the better rider you will become. Go to <*http://www.msf-usa.org*> to get more information about motorcycle rider courses in your area.

Army Regulation 385-55, *Prevention of Motor Vehicle Accidents*, lists the required items of protective clothing and equipment that each rider must wear. See Table 2 for a complete list. The quality of the clothing and equipment has a direct relationship to how much risk is accepted. Riders who purchase the bare-minimum clothing will reduce their risk of being injured in a motorcycle accident. However, purchasing quality motorcycle rider gear can reduce this risk even more. Helmets are a good example. Riders on a military installation must wear at least an approved 1/2-shell helmet. However, if they were to wear an approved 3/4-shell or a full-face helmet, they could reduce their risk even more. The same thing goes for the shirt or pants. Riders can wear a regular pair of pants and a shirt with long sleeves and get by. But they would be much safer if they wore the new jackets and pants with ballistic protection sold by many manufacturers today. This ballistic protection is located in areas where the body is most likely to be injured in a crash. Using it will greatly reduce the risk of injury in an accident.

Since riding a motorcycle requires a great deal of concentration, it is surprising that many riders still drink and drive. If you plan to drink, don't drive. Your chances of having an accident are far greater if you have been drinking. Riders should make sure they don't take prescription or over-the-counter medications prior to riding. Read the label, and if it has a warning about driving or operating heavy equipment or machinery, that means you don't ride. Along with these hazards comes the risk of riding when you're tired. As you know, it is very hard to drive a car when you're tired; it is much worse trying to operate a motorcycle. You may think that you are riding fine until an emergency occurs and you can't react to it.

Motorcycle

Even though you may be prepared to ride, is your bike ready to be ridden? First, does it fit you? And secondly, is it in good working order? Is the bike the right size for you? You can tell by sitting on the seat and putting both feet flat on the ground. If you can't do this, the bike is too tall. Now try to reach all the controls. You must be able to reach the handlebars, clutch lever, brake lever and pedal, throttle, and shift lever with ease. And is your bike in good working order? How do you know? The MSF has a preride checklist that is represented by the acronym T-CLOCS:

- T - tires and wheels
- C - controls
- L - lights and other electrical items
- O - oil
- C - chassis
- S - side stand

By conducting this quick inspection and fixing those items that don't work, you can greatly reduce your risk.

Road and Traffic

The last things to consider are the road and traffic conditions. You can choose the place and time you ride; make it the safest time and place. Don't ride in areas with limited visibility or rough and sandy roads. These can cause or

Clothing/Equipment	Description
Helmet	They come in full face, 3/4 shell, and 1/2 shell. The Department of Transportation or Schnell Foundation must approve the helmet. The full face provides the best protection followed by the 3/4 shell. The 1/2 provides the least amount of protection.
Gloves	They should be leather and have full fingers. It is best to purchase motorcycle gloves because they are sewn to put the seams outside the glove and curve of the fingers.
Shirt	They should have long sleeves and be made of a durable fabric. Consider a jacket or riding suit with ballistic protection.
Pants	They should be long and made of a durable fabric. Consider pants or a riding suit with ballistic protection.
Reflective Material	Many use a road guard vest or jogging belt. The jogging belt is only visible when it is worn diagonally across the torso.
Shoes	Should be over-the-ankle boots or shoes. No high heels on boots and no large toes. Consider a pair of motorcycle boots.
Protective Eye Wear	Don't rely on the face shield to protect you. Wear impact-resistant eyewear even if you wear a face shield. Invest in a pair of impact-resistant sunglasses.

Table 2. Required Protective Clothing and Equipment

contribute to an accident. You may also want to avoid heavy traffic times. Most car and truck drivers are not watching for motorcyclists and often don't see them. Not riding in these time periods can reduce your risk.

Strategy

In addition to identifying the hazards and eliminating those you can prior to riding, the MSF recommends a strategy for riding your motorcycle. The strategy is known by the acronym SEE.

- S - Search for hazards constantly as you ride.
- E - Evaluate those hazards first to determine if they have an impact on you, then develop a course of action for each.
- E -Execute the course of action you determined in the evaluation step.

Sounds familiar. doesn't it? This is a constant update of the risk management process. The more you use it, the better you will become.

Summary

Whether you are a new rider or have been riding for 20 years, you can become the victim of a motorcycle accident. You can reduce the potential for that accident by using the risk management process described in this article to identify and eliminate hazards. Don't become overwhelmed by all of the hazards. Riding a motorcycle is more dangerous than driving a car, and most—if not all—riders know this. To be a successful rider, control the hazards you can, and reduce your risk. Let motorcycling be fun and enjoyable.

For additional information, refer to the U.S. Army Safety Center Web site at *<http://safety.army.mil/home.html>* or the Motorcycle Safety Foundation Web site at *<http://www.msf-usa.org>*.

Endnotes

[1] Jayne O'Donnell, "Traffic deaths rise to 12-year high," *USA Today*, 25 April 2003, p. A-1.

[2] Master Sergeant Dave Hembroff, "Learn and Live," *Countermeasure*, April 2003, pp. 16-18.

Mr. Fanning is the safety director for the U.S. Army Maneuver Support Center and Fort Leonard Wood. He is also nationally certified by the Motorcycle Safety Foundation as a RiderCoach and serves as the RiderCoach/instructor for Fort Leonard Wood. He can be contacted at <fred.fanning@us.army.mil>.

Task Force Neighborhood

By Specialist Joshua Hutcheson

The streets of Mosul are slowly but surely being cleaned by the soldiers of the 37th Engineer Battalion. Labeled Task Force Neighborhood, the civil operation was modeled after similar successful projects in Baghdad. The vacant lots of the city are filled with a variety of garbage—rotting vegetables, old clothes, and animal waste are the most easily identifiable. The rest has turned into a sort of brown and gray compost pile, home for thousands of flies and food for roaming chickens. This is where Task Force Neighborhood works.

The engineers arrive at the makeshift dumps with an escort of soldiers from the 502d Infantry Regiment and an assortment of tools for cleaning: brooms, shovels, garbage bags, and wheelbarrows. The soldiers have two missions when they go out—to clean the neighborhood and to pump money into the Mosul economy. To achieve these missions, they employ Iraqis to help them clean. A psychological operations team accompanies the engineers with a taped message informing local citizens that they can make money helping the soldiers clean the streets. The unit offers Iraqis "two or three dollars to work."

The soldiers and Iraqis have at their disposal handheld tools as well as bulldozers and dump trucks. The bigger equipment takes care of the largest portions of trash, then people with shovels and brooms come in to get refuse in hard-to-reach places. So far Task Force Neighborhood has cleaned two vacant lots, one of which had between 30 and 40 dump truckloads of garbage, and the streets and gutters around a downtown mosque. The trash carted away goes to a landfill about a 40-minute drive southwest of town. The engineers have a long, hard job ahead of them. Cleaning the makeshift dumps takes a lot of effort and time. Besides getting rid of newly made dumps all over Mosul, the engineers also have to work to keep clean the areas they just beautified. One recently cleaned dump already has trash in it.

Specialist Hutcheson is a journalist with the 101st Airborne Division (Air Assault), Fort Campbell, Kentucky, serving in Iraq.

Kazer Bridge Restoration

By Specialist Robert Woodward

During a three-day project, engineers of the 101st Airborne Division spanned the Kazer River, a tributary of the Tigris River, and gave control of the bridges to local officials. The construction effort was part of the stability and support operations the division is conducting in northern Iraq.

The new bridges eased congestion along Highway 2, a main artery between Mosul and Erbil, the two largest cities in northern Iraq. The four-lane highway crossed the Kazer over two bridges, both of which were partly blown up by Iraqi forces during the war. The southern span was only partially destroyed, while the northern bridge was completely disabled. Iraqi traffic continued to use the bridges, leading to a "rather unsafe" condition.

The first day of work began when the sappers of the 326th Engineer Battalion, Fort Campbell, Kentucky, cleared away the collapsed portion of the northern bridge, which leaned precariously on supporting pylons. Careful placement of C-4 plastic explosives would allow the bridge section to fall to the riverbed without striking the pylons, which could cause the rest of the bridge to tumble down. A 25-foot hydraulic excavator was used to move rubble away from the work area and then to raise the engineers up under the bridge to place the charges. Steel pickets and wooden beams were used to wedge explosives into place, and then fuse line was let out 500 meters to the detonation site.

Soldiers of the 310th Psychological Operations Company roamed the area, using loudspeakers mounted on their high-mobility, multipurpose wheeled vehicles (HMMWVs) to instruct gathering villagers in Arabic to move back and take cover. Traffic was blocked from the east and west, and OH-58 Kiowa Warrior helicopters flew over the site, watching for breaches in safety and security.

Crater charges propelled the end of the bridge upward. According to the assistant division engineer, the battalion used more than 1,000 pounds of explosives to knock down the bridge section and didn't do any damage to the nearby villages or harm any people.

The next morning, the 299th Engineer Company of Fort Belvoir, Virginia, prepared to put up a single-lane medium girder bridge made of aluminum and especially designed for quick construction. The unit measured the gap and decided that 16 links of the bridge were needed to span the 34 meters. Soldiers worked in groups, picking up bridge pieces weighing as much as 600 pounds and assembling them. First, the bridging company set up the staging portion of the bridgeworks, which acted as a launching mechanism for the boom of the hydraulic excavator. The boom was extended link by link until it reached the far side. Then the boom was used to support the bridge as it was pushed over the gap by a large truck.

U.S. Army photo by SPC Robert Woodward

Combat engineers of the 326th Engineer Battalion, 101st Airborne Division, prepare a counterforce charge used to blast away a fallen segment of the Kazer Bridge near Mosul, Iraq, 28 April 2003.

Though the bridge was constructed quickly, it's no slapdash structure, but a one-lane bridge that can hold 70 tons. A section from the 74th Engineer Company (Assault Float Bridge), Fort Hood, Texas, arrived and added another lane to the northern bridge using the Army's new dry support bridge. The main advantage in using the dry support bridge is that the launch vehicle does the heavy lifting during construction. Since soldiers did not have to pick up the heavy pieces, it took only eight people to assemble the bridge.

Turning the bridges over to the Iraqi people was one more step toward restoring the economy and security of the region.

Specialist Woodward is a journalist with the 101st Airborne Division (Air Assault), Fort Campbell, Kentucky, serving in Iraq.

ENGINEER UPDATE

Commercial numbers are (573) 563-xxxx and Defense System Network (DSN) numbers are 676-xxxx unless otherwise noted.

TRADOC Systems Manager-Engineer Combat Systems

Wolverine. These systems were fielded to the 299th Engineer Battalion, Fort Hood, Texas, late last year. A third battalion set is scheduled for the 4th Engineer Battalion, Fort Carson, Colorado, in FY04. The last of the Wolverines will be fielded to the 3d Armored Cavalry Regiment at Fort Carson no later than FY05. Many of the vehicles will come from 4th Infantry Division when they go from 12 to 9 Wolverines per battalion. The Project Manager, Abrams Tank Systems manages the Wolverine program.

Airborne Standoff Mine-Detection System (ASTAMIDS). In May, the Project Manager, Close Combat Systems (PM-CCS) awarded a development contract for ASTAMIDS to Northrup Grumman. The ASTAMIDS sensor will also be developed to fill the Army's need for an advanced reconnaissance, surveillance, and target acquisition (RSTA) sensor, capable of target designation. The goal is for this to be the embedded sensor on all larger unmanned aerial vehicles (UAVs).

Ground Standoff Mine-Detection System (GSTAMIDS). Development on the Block 0 (Improved Interim Vehicle-Mounted Mine Detector) program is being terminated. An FCS-based GSTAMIDS program will begin in October.

Handheld Standoff Mine-Detection System (HSTAMIDS). An interim fielding of 200 HSTAMIDSs was completed in February to support Operation Enduring Freedom and Operation Iraqi Freedom. Commanders taking over some of the 200 units in either area of operation need to plan for operator training time. The radar-based HSTAMIDS, which is fundamentally different from metal detectors, requires from 32 to 40 hours of training. Operational testing for HSTAMIDS was conducted in May at Yuma Proving Grounds. Minor design improvements have been identified for incorporation in the full-rate HSTAMIDS production to begin later this year.

Mongoose. This C-130-transportable countermine system is optimized for the Stryker Brigade Combat Team. Its explosive net defeats all mines regardless of fuzing. Flight testing is underway this summer at Yuma Proving Grounds, and fielding is scheduled for FY05.

Intelligent Munition System (IMS). The PM-CCS awarded two contracts for the initial phase of IMS development to General Dynamics and Textron Defense Systems.

POC is Mr. Eric McGrath at *<mcgrathe@wood.army.mil>* or (573) 563-4081/4085. Pictures and briefings are available at the TSM-ECS home page at *<http://www.wood.army.mil/TSM/>*.

News and Notes

Deployment Teambuilding at the Army Management Staff College. Fifteen soldiers from the 1st Information Operations Command at Fort Belvoir, Virginia, attended a first-ever Deployment Teambuilding session at the Army Management Staff College (AMSC) on 24 July 2003. These soldiers will soon deploy for six months to multiple locations in Iraq.

Why teambuilding? An Information Operations planner at 1st Information Operations Command, who was previously deployed to Kosovo and knew the inherent problems that could develop when integrating a small group of subject matter experts into an already existing staff, searched for a resource that could provide actionable skills on group dynamics. He wanted tools to assist the team members in coordinating, synchronizing, and integrating actions in the information environment of a very diverse group, a multinational coalition, in order to accomplish a common goal.

After finding that there was neither an in-house capability for such training nor a comprehensive Army course catalog, the planner contacted AMSC at *<http://www.amsc.belvoir.army.mil>*. The chairman of the Department of Leadership and Management at AMSC worked with the staff to develop a course that met 1st Information Operations Command requirements. The chairman saw a great opportunity to support soldiers on the battlefield, a goal he says is part of the charter of the sustaining base program.

According to the chief of the 1st Information Operations Command Field Support Division, it is quite unusual for a large Army educational institutional to be flexible enough to react so quickly since the time lapse was only ten days from the initial call to the scheduled class. If all goes well, 1st Information Command will look into the possibility of adding the AMSC course as a regular part of predeployment training for field support teams deploying from Fort Belvoir to support land component commanders worldwide.

POC is Ms. Mary Ann Hodges at *<maryann.hodges@amsc.belvoir.army.mil>* or (703) 805-4766.

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